ENVIRONMENTAL IMPACT ANALYSIS PROCESS

SMALL INTERCONTINENTAL BALLISTIC MISSILE PROGRAM

REGIONAL ENVIRONMENTAL ISSUE AREAS

UNITED STATES AIR FORCE

MARCH 1986

Air Force
Environmental Planning Division
(HQ USAF/CEVP)

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16 JUL 93

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REGIONAL ENVIRONMENTAL ISSUE AREAS

March 1986

CONTENTS

CONTENTS

CONTENTS

CONTENTS

REGIONAL ENVIRONMENTAL ISSUE AREAS

SOUTHWESTERN ARIZONA

Southwestern Arizona is being considered as a possible basing area for the Small Intercontinental Ballistic Missile (ICBM) under several different alternatives. Yuma Proving Ground and Luke Air Force Range are Candidate Deployment Installations for the Hard Mobile Launcher in Random Movement basing mode, with support functions to be provided at either Gila Bend Air Force Auxiliary Field or Yuma Proving Ground. Gila Bend Air Force Auxiliary Field and Yuma Proving Ground are also under consideration as separate alternatives for basing of missiles in the Hard Silo in Patterned Array mode. If Yuma Proving Ground is selected as a support base for the Hard Silo alternative, some silos may actually be located in a small adjoining portion of southeastern California. The discussions that follow provide an overview of the regional environmental issue areas that are under consideration for southwestern Arizona using, as an example, the case where Gila Bend Air Force Auxiliary Field would serve as the support base.

SOCIOECONOMICS

AREAS OF INVESTIGATION: Regional Growth, and Associated Demands on Housing, Public Services, and Public Finance

DISCUSSION: The potential deployment areas for southwestern Arizona are dispersed over a five-county region with a 1984 population of 2.5 million. The population is expected to increase by 3.0 percent annually, reaching 4.1 million by the year 2000. The civilian labor force within the region increased to over 1.2 million in 1984, and is estimated to reach nearly 2.2 million in the year 2000. The region's per capita income, adjusted for inflation, was $12,300 in 1984. It is projected to grow at an annual rate of 1.7 percent and reach $13,000 by the year 2000. The housing stock in Maricopa County, where Gila Bend Air Force Auxiliary Field is located, was estimated at almost 663,000 units in 1984. The vacancy rate was 5.6 percent with about 37,000 vacant units in 1984. Local public-sector employment in Maricopa County was 346 persons per 10,000 population, about equal to the state average in 1982. Education employment in 1982 was 121 per 10,000 population, compared to the state average of 129. School enrollments in 1985 reached a new peak of about 306,000 students, suggesting no current available capacity. Police employment in 1982 was 25 per 10,000 population compared to the state average of 24. Per capita public expenditures and revenues of local governments in Maricopa County were $2,130 and $2,016 in 1984, respectively.

TYPICAL ISSUES:

- Availability of housing in Maricopa County during peak project construction activity.
- Possible project-induced shortfalls in school capacities (K-12).

UTILITIES

AREAS OF INVESTIGATION: Demands on Utility Systems

DISCUSSION: Potable water is generally available throughout Maricopa County and ongoing planning efforts should assure adequate supplies through the year 2000. Wastewater treatment systems are presently operating near capacity to meet the needs of the fast-paced growth of the Phoenix metropolitan area. Recently adopted regulations will restrict the siting of needed landfills in the metropolitan portions of Maricopa County. However, waste disposal in the town of Gila Bend will be adequate throughout the study time frame. Based on current projections of supply and demand, energy utilities should be able to adequately meet the demands.

TYPICAL ISSUES:

- Possible additional demands on the currently expanding water and wastewater infrastructure in Maricopa County.
- Waste disposal problems given the current shortage of disposal areas in Maricopa County.

TRANSPORTATION

AREAS OF INVESTIGATION: Level of Service or Congestion on Regional Transportation Networks

DISCUSSION: The primary road network for the southwestern Arizona region includes two east-west interstate highways (Interstates 8 and 10) and two north-south two-lane roads (U.S. 95 and Arizona State Highway 85). Rail service is available in the southern and east-central parts of the study area, including the vicinity of the support base at Gila Bend Air Force Auxiliary Field. Major airline service is available at Phoenix, Arizona, and commuter service is available from Blythe and El Centro, California and Yuma, Arizona. The largest communities in the area are Phoenix and Yuma, Arizona and El Centro, California, with 1980 populations of 789,704; 42,433; and 23,996; respectively.

TYPICAL ISSUES:

- Increased congestion and decreased level of service due to workers commuting on primary roads such as Arizona State Highways 85 and 95 and Interstates 8 and 10.

LAND USE

AREAS OF INVESTIGATION: Existing Land Use Plans and Policies, Regional Recreation, and Visual Resources

DISCUSSION: Gila Bend Air Force Auxiliary Field, which is approximately 1,900 acres, is located in south-central Maricopa County. Areas of Luke Air Force Range and Yuma Proving Ground, which total more than 3.5 million acres, are used primarily for ranges and munitions storage. About 75 percent of the land on these bases is withdrawn from the public domain. Although Maricopa

County does not have land use plans for the areas around Gila Bend, the Town of Gila Bend has recently adopted a general plan that would provide for future growth from the current population of 2,000 to over 22,000. Numerous recreational opportunities, ranging from mountain, to desert, to river areas, are available within the general region. The visual resources of the southern Arizona area are characterized by level terrain dominated by creosote bush and other varieties of scrub vegetation commonly found in areas with dry climate and gravelly soil.

TYPICAL ISSUES:

- o Increased pressure on community planning activities in Maricopa County.
- o Increased use of recreational areas.
- o Potential visual changes to southern Arizona desert areas.

CULTURAL AND PALEONTOLOGICAL RESOURCES

AREAS OF INVESTIGATION: Cultural and Paleontological Resources of the Region

DISCUSSION: The cultural resource base includes prehistoric and historic archaeological sites, historic structures, an historic trail, railroads, mines, fossiliferous materials, and wells. Previous research on Luke Air Force Range and Yuma Proving Ground includes field surveys and archival and literature searches. No cultural resources projects have been carried out on Gila Bend Air Force Auxiliary Field. Existing information may not be representative of the kinds and numbers of cultural resources in the area. Cultural resource concerns include potential damage to unrecorded archaeological sites, historic structures, sacred areas important to American Indians, and paleontological sites.

TYPICAL ISSUES:

- o Potential disturbance of National Register of Historic Places eligible sites in southern Arizona.
- o Potential conflicts with locations important to American Indians for religious or economic uses.

BIOLOGICAL RESOURCES AND THREATENED AND ENDANGERED SPECIES

AREAS OF INVESTIGATION: Regional Vegetation, Wildlife, Aquatic Habitats, Unique and Sensitive Habitats, and Threatened and Endangered Species

DISCUSSION: The vegetation and wildlife in and around southwestern Arizona are characteristic of the Sonoran Desert. Paloverde-saguaro, paloverde-cactus, and creosote bush communities dominate the landscape. Game species such as quail, dove, deer, and bighorn sheep, and many desert-adapted birds, mammals, and reptiles, inhabit the area. Unique and sensitive habitats are associated with the desert region and some of the major aquatic resources. Recreational opportunities exist in reservoirs along the Salt, Verde, and lower Colorado rivers, and in the Salton Sea. The Sonoran pronghorn antelope,

a federal endangered species, occurs within installation boundaries, and the endangered peregrine falcon may occur there occasionally. The considerable growth and development forecast for the proposed project region in coming years is expected to result in increased impacts to biological resources of the area, regardless of whether the project is implemented.

TYPICAL ISSUES:

- Possible disturbance of the Sonoran Desert vegetation and wildlife habitat.
- Potential disturbance of biological resources of Cabeza Prieta and Kofa national wildlife refuges.
- Proximity of proposed project to unique biological habitats, such as designated natural areas, wilderness study areas, and desert wash and riparian habitats.
- Potential effects on threatened and endangered species, such as the Sonoran pronghorn antelope.

AIR QUALITY AND NOISE

AREAS OF INVESTIGATION: Air Quality and Visibility Conditions and Noise Levels

DISCUSSION: The Yuma Proving Ground and Luke Air Force Range Candidate Deployment Installations, as a result of their location in the Sonoran Desert of southwestern Arizona, are among the drier areas of the country. Precipitation in the region averages about 3.5 inches per year. The good regional visibility is occasionally reduced to less than 7 miles by wind-borne dust. Air quality standards for total suspended particulates are exceeded in several designated nonattainment areas. Carbon monoxide standards are exceeded in Phoenix (which is close to, but outside the study area), but not in Yuma. No major pollutant sources exist on either Yuma Proving Ground or Luke Air Force Range. Future projections suggest no significant regional air quality changes. Noise sources, propagation/attenuation conditions, and community noise sensitivity within this region are currently not problems and are not expected to be in the future.

TYPICAL ISSUES:

- Possible changes in the good regional visibility of southern Arizona.
- Short-term degradation of air quality during construction.
- Possible delays in meeting Environmental Protection Agency mandated air quality levels in designated nonattainment areas.
- Possible short-term increases in noise levels due to construction activities.

WATER RESOURCES

AREAS OF INVESTIGATION: Surface Water and Groundwater Quantity and Quality Conditions and Their Uses

DISCUSSION: Water is a critical resource in this arid southwestern region of Arizona. Except for the Colorado River, virtually all streams are intermittent. Water quality varies from good to poor throughout the area. The predominant water use in the area is for crop irrigation. Of the 1.4 million acre-feet of groundwater extracted in 1983, 73 percent was used for agriculture, 17 percent for municipal and industrial, and 10 percent for drainage of waterlogged areas. Another 1.5 million acre-feet of surface water is used in the Phoenix and Yuma areas, where the majority of the region's water use occurs. Most of the groundwater basins in southwestern Arizona are in overdraft. With the importation of Central Arizona Project water to the Phoenix area starting in 1985, the severe overdrafting should be substantially reduced.

TYPICAL ISSUES:

- o Possible water quality degradation in groundwater basins.
- o Possible interference with existing agricultural water users.
- o Potential alteration in surface drainage patterns (Hard Silo).
- o Groundwater withdrawal from overdrafted basins, except in the Yuma area.
- o Compliance of the proposed project with state water law.

GEOLOGY AND SOILS

AREAS OF INVESTIGATION: Engineering Geologic Conditions Including Potential Geologic Hazards and Conditions of Geologic Materials, Regional Energy and Mineral Resources, and Soil Resources

DISCUSSION: Mountain ranges in the region trend northwest-southeast and consist of igneous and metamorphic rocks. Three major fault systems, estimated to have a maximum credible earthquake magnitude of 8.0, are located about 25 miles west of Luke Air Force Range. Areas susceptible to ground subsidence due to groundwater withdrawal and mass movements (e.g., debris flows) exist in the area. Several commodity occurrences or raw materials on the Strategic and Critical Materials list have been documented, and active mining districts exist for select commodities such as copper and gold. Known Geothermal Resource Areas exist in the western portion of the area. Aggregate suitable for concrete and other construction purposes is available. Prime and important farmlands are concentrated along the Colorado River. Areas of moderate to high potential for soil erosion are frequently associated with the young alluvial fans and floodplains of the region and on the installations.

TYPICAL ISSUES:

- Public health and safety considerations adjacent to the San Andreas-Imperial seismically active regions.
- Shortfalls in the availability of aggregate resources in the Gila River basin.
- Distribution of soils sensitive to erosion in the Sonoran Desert.

REGIONAL ENVIRONMENTAL ISSUE AREAS

NORTHWESTERN FLORIDA

Northwestern Florida is being considered as a possible basing area for the Small Intercontinental Ballistic Missile (ICBM) in the Hard Mobile Launcher in Random Movement basing mode at Eglin Air Force Base. The discussions that follow provide an overview of the regional environmental issue areas that are under consideration for northwestern Florida.

SOCIOECONOMICS

AREAS OF INVESTIGATION: Regional Growth, and Associated Demands on Housing, Public Services, and Public Finance

DISCUSSION: The potential deployment areas for northwestern Florida are dispersed over a ten-county region of the Florida Panhandle and southern Alabama with a 1984 population of 713,000. The population is expected to increase by 1.6 percent annually, reaching over 916,000 in the year 2000. The civilian labor force within the region increased to over 306,000 in 1984 and is estimated to reach almost 442,000 in the year 2000. The region's per capita income, adjusted for inflation, was $9,800 in 1984. It is projected to grow at an annual rate of 1.1 percent and reach $12,000 by the year 2000. The housing stock in Okaloosa County, where Eglin Air Force Base is located, was estimated at 47,100 units in 1984. The vacancy rate was 6.6 percent with about 3,100 vacant units in 1984. Local public-sector employment in Okaloosa County was 321 persons per 10,000 population, 8.3 percent below the state average in 1982. Education employment in 1982 was 95 per 10,000 population, compared to the state average of 104. School enrollments continued a downward trend reaching 22,700 students in 1985, suggesting considerable available capacity. Police employment in 1982 was 17 per 10,000 population, which is below the state average of 28. Per capita public expenditures and revenues of local governments in Okaloosa County were $1,121 and $1,131 in 1984, respectively.

TYPICAL ISSUES:

- Potential beneficial effects from higher utilization of classroom facilities in Okaloosa County.
- Potential public service degradation in the short term due to rapid increases in project-related demand.
- Potential shortfalls of public revenues during the peak project construction period.

UTILITIES

AREAS OF INVESTIGATION: Demands on Utility Systems

DISCUSSION: Okaloosa County's potable water treatment facilities will have the capacity to treat demands through the late 1990s. Additional facilities may be required to meet increasing demands in the year 2000. Wastewater treatment facilities will continue to provide adequate treatment through 1990.

Present facilities will require expansion to meet increasing demands for treatment. Solid waste facilities exist to handle wastes through 1995; after that, facility expansions or new sites will be required. Electric power and natural gas supplies are currently meeting the demands of the region. Suppliers of both resources indicated that adequate supplies are available to meet increasing demands.

TYPICAL ISSUES:

- o Available capacity in Okaloosa County water treatment and distribution systems.
- o Adequacy of wastewater treatment systems to meet long-term growth requirements.
- o Solid waste disposal capacity.

TRANSPORTATION

AREAS OF INVESTIGATION: Level of Service or Congestion on Regional Transportation Networks

DISCUSSION: The primary road network for the northwestern Florida region includes four major east-west highways (Interstate 10, U.S. 90 and 98, and Florida State Highway 20) and seven major north-south routes, three of which (Florida State Highways 85 and 87 and U.S. 331) transect Eglin Air Force Base. The cantonment area is the support base for Eglin Air Force Base, and is reached via Florida State Highway 85. Rail service is available east, west, and north of Eglin Air Force Base, with main line service along its northern border. The study area is serviced by three commercial airports at Pensacola, Panama City, and Fort Walton Beach, Florida, all of which are served by major airlines. The largest communities in the area are Pensacola/West Pensacola (1980 census populations of 57,619 and 24,371), Fort Walton Beach (20,829), and Panama City (33,346), Florida; and Mobile (200,452) and Prichard (39,541), Alabama.

TYPICAL ISSUES:

- o Increased congestion and decreased level of service due to workers commuting on primary roads such as sections of U.S. 98 (between Pensacola and Panama City), Interstate 10, and Florida State Highway 85.

LAND USE

AREAS OF INVESTIGATION: Existing Land Use Plans and Policies, Regional Recreation, and Visual Resources

DISCUSSION: Eglin Air Force Base, occupying about 463,500 acres, is located in three Florida counties. About 71 percent of the base land is fee-owned by the Department of Defense; the remainder is withdrawn public domain land.

Although Okaloosa County does not have a general land use plan, the cities of Fort Walton Beach, Niceville, Crestview, Mary Esther, and Valparaiso have such plans. These plans provide for continued expansion of each city's infrastructure to absorb future populations. Regional recreation areas in the vicinity of Eglin Air Force Base include 2 national forests, 20 state parks, and Gulf Islands National Seashore. The rolling terrain of the region contains many lakes and streams, and is mainly wooded with oak and pine.

TYPICAL ISSUES:

- o Increased pressure on community planning activities in Okaloosa County.
- o Increased use of regional recreation areas.
- o Potential changes in the visual resources environment.

CULTURAL AND PALEONTOLOGICAL RESOURCES

AREAS OF INVESTIGATION: Cultural and Paleontological Resources of the Region

DISCUSSION: The cultural resource base includes prehistoric and historic archaeological sites, historic trails, and cemeteries. Recent cultural resources investigations include data synthesis, field reconnaissance, development of predictive models of site location, and assessment of eligibility for the National Register of Historic Places. Approximately 12 percent of Eglin Air Force Base has been surveyed using a combination of statistical and judgmental sampling. At least one large paleontological exposure has been recorded. Existing information is representative of the kinds and numbers of cultural resources in the general area. Cultural resource concerns include potential damage to unrecorded prehistoric and historic archaeological sites, historic cemeteries, and paleontological sites.

TYPICAL ISSUES:

- o Potential disturbance to National Register of Historic Places eligible sites in northwestern Florida.
- o Potential damage to cemeteries.
- o Potential damage to paleontological sites.

BIOLOGICAL RESOURCES AND THREATENED AND ENDANGERED SPECIES

AREAS OF INVESTIGATION: Regional Vegetation, Wildlife, Aquatic Habitats, Unique and Sensitive Habitats, and Threatened and Endangered Species

DISCUSSION: The most common vegetation of Eglin Air Force Base and its environs is forest, dominated by longleaf pine, slash pine, and/or various hardwood species. Aquatic habitats including marshes, bogs, ponds, brackish bays, and streams (supporting water-edge forest) are also abundant. Notable wildlife species are whitetail deer, wild hog, turkey, bobwhite quail, raccoon, raptors (birds of prey), and waterfowl. Numerous sensitive areas occur largely along aquatic habitats on the base and in surrounding areas. Two

federal endangered species, the red cockaded woodpecker and Okaloosa darter, and one threatened species, the eastern indigo snake, occur on the base. The proposed project area is expected to experience little development and population growth if the project is not implemented. This will likely result in minimal new impacts to biological resources.

TYPICAL ISSUES:

- o Potential disturbance of coastal forest, woodland vegetation, and wildlife habitat.
- o Possible effects on aquatic habitats, such as those of streams, marshes, brackish bays, and coastal marine habitats.
- o Potential disturbance of unique biological habitats and special management areas.
- o Proximity of the proposed project to habitat of the red-cockaded woodpecker, Okaloosa darter, and other protected species.

AIR QUALITY AND NOISE

AREAS OF INVESTIGATION: Air Quality and Visibility Conditions and Noise Levels

DISCUSSION: The northwestern Florida region is located on the Gulf Coast and characterized by a humid climate. The area receives over 64 inches of rain annually. Visibility ranges between 10 and 25 miles, but fog may reduce it to 2 miles or less up to 20 percent of the time each month. Air quality monitoring indicates that violations of total suspended particulates standards occur once or twice a year and that no carbon monoxide violations have occurred. No major air quality changes are forecast. Noise sources, sound propagation, and community noise sensitivity are not presently a problem in this area and are not expected to be in the future.

TYPICAL ISSUES: No important project-related issues relative to air quality and noise are anticipated in the northwestern Florida region.

WATER RESOURCES

AREAS OF INVESTIGATION: Availability of Surface Water and Groundwater and Water Quality Conditions

DISCUSSION: The northwestern Florida region receives abundant rainfall, and it contains several of the larger rivers in Florida and two major estuaries: Pensacola and Choctawhatchee bays. Surface water is used infrequently in the study area, although approximately 11 million acre-feet per year are available for use. The great majority of water used in the region is derived in about equal portions from the Floridan and the sand and gravel aquifers. Water quality in the area is generally excellent except that some waters are acidic due to natural causes. Total water use in the study area in 1980 was 145,000 acre-feet. Municipal and industrial use accounted for the great majority (86%). Population increases are expected and, by the year 2000, projected

public supply demands will more than double to about 300,000 acre-feet per year. With the exception of southern Okaloosa County, local water supplies are generally adequate to meet future water needs.

TYPICAL ISSUES:

- o Substantial groundwater declines in the Floridan Aquifer in south Okaloosa County that may be accelerated by the proposed project.
- o Possible degradation of the good water quality of Choctawhatchee Bay or its tributaries.
- o Potential need to accelerate plans for importation of water to southern Okaloosa County.

GEOLOGY AND SOILS

AREAS OF INVESTIGATION: Engineering Geologic Conditions Including Potential Geologic Hazards and Conditions of Geologic Materials, Regional Energy and Mineral Resources, and Soil Resources

DISCUSSION: The study area is located in the low-relief, coastal regions of northwestern Florida, which are characterized by southward-dipping terrestrial and marine sediments. Northwestern Florida is an area of low seismic activity with no reasonable expectancy of earthquake damage. Some portions of the area may be susceptible to ground subsidence, but in general, geologic hazards are minimal. Major oil and gas fields exist in Santa Rosa County, Florida, and geologic conditions on Eglin Air Force Base are thought to be suitable for hydrocarbon accumulations. No known aggregate resource areas have been identified on the installation; crushed rock aggregate used at Eglin Air Force Base is transported from sources near Birmingham, Alabama. Much of the land in the area and on the installation is considered prime farmland or farmland of statewide importance, with sheet erosion being a more severe problem than wind erosion.

TYPICAL ISSUES:

- o Conflicts with important oil and gas resources.
- o Availability of suitable aggregate resources in the Panhandle region.
- o Effect on important farmland in northwestern Florida.

REGIONAL ENVIRONMENTAL ISSUE AREAS

SOUTHERN NEVADA

Southern Nevada is being considered as a possible basing area for the Small Intercontinental Ballistic Missile (ICBM). Nellis Air Force Range and the Nevada Test Site are Candidate Deployment Installations for the Hard Mobile Launcher in Random Movement basing mode, with support functions to be provided at either Indian Springs Air Force Auxiliary Field or Nellis Air Force Base. The discussions that follow provide an overview of the regional environmental issue areas that are under consideration for southern Nevada.

SOCIOECONOMICS

AREAS OF INVESTIGATION: Regional Growth, and Associated Demands on Housing, Public Services, and Public Finance

DISCUSSION: The potential deployment areas for southern Nevada are dispersed over a four-county region in southern Nevada with a 1984 population of over 580,000. The population is expected to increase by 3.1 percent annually, reaching almost 942,000 in the year 2000. The civilian labor force within the region increased to about 286,000 in 1984 and is estimated to reach 512,000 in the year 2000. The region's per capita income, adjusted for inflation, was $12,100 in 1984. It is projected to grow at an annual rate of 0.6 percent and reach $13,200 by the year 2000. The housing stock in Clark County, where both Indian Springs Air Force Auxiliary Field and Nellis Air Force Base are located, was estimated at 223,000 units in 1984. That year, the vacancy rate was 6.4 percent, with about 14,300 vacant units. Local public-sector employment in Clark County was 315 persons per 10,000 population in 1982, 9.5 percent below the state average. Education employment in 1982 was 152 per 10,000 population, compared to the state average of 114. School enrollments in 1985 reached a new high of 89,300 students, suggesting no current available capacity. Police employment in 1982 was 32 per 10,000 population compared to the state average of 34. Per capita public expenditures and revenues of local governments in Clark County were $1,476 and $1,410 in 1984, respectively.

TYPICAL ISSUES:

- Project-induced demand for housing could create a very high housing market since a high rate of growth is projected for Clark County.
- Potential beneficial effects from increased employment opportunities resulting from the proposed project in Clark County.
- Some public services may experience a decline in service levels due to additional project-related demands.

UTILITIES

AREAS OF INVESTIGATION: Demands on Utility Systems

DISCUSSION: Potable water treatment facilities for the majority of Clark County currently exist to meet the needs of the region through the year 2000. Wastewater treatment facilities in Clark County are processing wastewater

flows adequately and should be able to meet the needs of the expanding population with existing or programmed facilities. Solid waste disposal sites will be required after 1988. Electric power and natural gas supplies are adequate and have excess capacity available to meet the growing requirements of the region.

TYPICAL ISSUES:

- o Adequacy of water treatment and distribution systems in Clark County.
- o Sufficient wastewater treatment facilities to meet water quality requirements.
- o Availability of landfill space.

TRANSPORTATION

AREAS OF INVESTIGATION: Level of Service or Congestion on Regional Transportation Networks

DISCUSSION: The primary road network in the study area for southern Nevada includes Interstate 15, which passes northeast-southwest along the southeast corner of the area, and U.S. 95, 93, and 6 on the southwest, east, and north borders, respectively. These three U.S. routes, and Interstate 15 and Nevada State Highway 375, completely encircle Indian Springs Air Force Auxiliary Field, Nellis Air Force Range, and the Nevada Test Site. There are no public roads passing through any of the three installations. Rail service is available to the southeast portion of the area approximately parallel to Interstate 15; however, no rail service is available to Indian Springs Air Force Auxiliary Field, Nellis Air Force Range, or the Nevada Test Site. Major airline service is available at Las Vegas, Nevada on the southeast border of the area. The largest communities in the study area are Las Vegas, Nevada (1980 census population of 164,674), North Las Vegas (42,739), and Nellis Air Force Base (7,476), all located in the southeast portion of the area.

TYPICAL ISSUES:

- o Increased congestion and decreased level of service due to workers commuting on primary roads such as U.S. 95 and sections of Interstate 15 between Nellis Air Force Base and Las Vegas.

LAND USE

AREAS OF INVESTIGATION: Existing Land Use Plans and Policies, Regional Recreation, and Visual Resources

DISCUSSION: The southern Nevada region contains Indian Springs Air Force Auxiliary Field, the Nevada Test Site, Nellis Air Force Range, and Nellis Air Force Base which are in three Nevada counties. Indian Springs Air Force Auxiliary Field is used for aircraft emergency use, gunnery range maintenance, and associated support facilities. The Nevada Test Site is used for nuclear and nonnuclear testing projects. Nellis Air Force Range is primarily used for training combat crews and weapons testing. A portion of Nellis Air Force

Range is in the Desert National Wildlife Range. Nellis Air Force Base is primarily used for fighter pilot training. About three-fourths of lands within the four bases have been withdrawn from the public domain. Clark County (Nevada) controls local land use and has a general plan for the area. Regional recreation areas nearby include Death Valley National Monument, Lake Mead National Recreation Area, and several Nevada state parks. The landscape is marked by typical range and basin geophysical characteristics and is dominated by creosote bush.

TYPICAL ISSUES:

- o Increased pressure on community planning activities.
- o Increased use of regional recreation areas such as Lake Mead National Recreation Area.

CULTURAL AND PALEONTOLOGICAL RESOURCES

AREAS OF INVESTIGATION: Cultural and Paleontological Resources of the Region

DISCUSSION: The cultural resource base includes prehistoric and historic archaeological sites, historic trails, mining camps and districts, railroads, and American Indian sacred areas. Cultural resources investigations include overviews, field surveys, and excavations at selected sites. Only a small portion of each installation has been studied, but work completed to date provides adequate information to make general statements about cultural resources. Paleontological localities have not been documented but probably occur within the area. Cultural resource concerns include potential damage to unrecorded archaeological sites and sacred areas important to American Indians.

TYPICAL ISSUES:

- o Potential disturbance to National Register of Historic Places eligible prehistoric or historic sites in southern Nevada.
- o Potential conflicts with American Indians on locations important for religious or economic uses.
- o Potential damage to paleontological localities.

BIOLOGICAL RESOURCES AND THREATENED AND ENDANGERED SPECIES

AREAS OF INVESTIGATION: Regional Vegetation, Wildlife, Aquatic Habitats, Unique and Sensitive Habitats, and Threatened and Endangered Species

DISCUSSION: The southern Nevada region is located in a transitional area between the Mojave Desert and Great Basin, providing a diverse mixture of biological communities. Vegetational communities range from creosote bush at lower elevations, to blackbrush at higher elevations, to Joshua tree woodlands on mesas and slopes. Wildlife species include coyote, bighorn sheep, fox, golden eagle, and migrating waterfowl. Only a few major aquatic habitats occur in the area. Aquatic recreational opportunities nearby include wildlife refuges, Lake Mead, and the Colorado River. Most of the identified unique and

sensitive habitats are associated with government lands although several occur on private lands. Several endangered fish species occur in creeks and springs of the area. The proposed project area is expected to receive considerable development and population growth, regardless of whether the project is implemented. Increased pressure on biological resources of the area is likely.

TYPICAL ISSUES:

- o Potential disturbance to vegetation and wildlife habitat of the Mojave and Great Basin deserts.
- o Proximity of project effects to the Desert National Wildlife Range, the desert bighorn sheep, and other biological resources of the range.
- o Possible effects on sensitive desert spring, wash, and riparian habitats.
- o Potential disturbance of habitat of endangered fish species that occur in springs and watercourses of the region.

AIR QUALITY AND NOISE

AREAS OF INVESTIGATION: Air Quality and Visibility Conditions and Noise Levels

DISCUSSION: The study area, located just east of the Sierra Nevada Mountains in southern Nevada, receives about 3 to 4 inches of precipitation. Annual wind speeds average 12 miles per hour with extended calm periods (18 to 30% of the time). Blowing dust causes occasional visibility reductions during the stronger wind periods. Summer thunderstorms with heavy precipitation can cause flash flooding. Air quality monitoring in Las Vegas Valley indicates routine violations of total suspended particulates standards in some areas, with carbon monoxide violations occurring in the downtown Las Vegas area. No major changes in the future are expected, although control measures for the nonattainment area have been instituted. Noise sources, sound propagation, and community noise sensitivity are not presently a problem in this area, and this situation is not expected to change.

TYPICAL ISSUES:

- o Possible aggravation of occasional visibility reductions and total suspended particulate standards violations in presently undisturbed areas.
- o Introduction of additional pollution potential.
- o Possible delay in meeting Environmental Protection Agency mandated air quality levels in the urban nonattainment area around Las Vegas.
- o Possible short-term increases in noise levels due to construction activities.

WATER RESOURCES

AREAS OF INVESTIGATION: Availability of Surface Water and Groundwater and Water Quality Conditions

DISCUSSION: The only large stream in the region is the Colorado River, located in the southeast portion of the area. Large amounts of groundwater can generally be found, although at considerable depth in some areas. The rate of recharge is very small. Groundwater quality is generally good. Water use in the area totals around 220,000 acre-feet per year and is concentrated around Las Vegas, Nevada. Las Vegas is projected to have an adequate supply to meet projected needs.

TYPICAL ISSUES:

- o Groundwater withdrawal from overdrafted basins.
- o Potential for development of new water sources, particularly the deep, regional carbonate aquifer.
- o Compliance of the proposed project with state water law.

GEOLOGY AND SOILS

AREAS OF INVESTIGATION: Engineering Geologic Conditions Including Potential Geologic Hazards and Conditions of Geologic Materials, Regional Energy and Mineral Resources, and Soil Resources

DISCUSSION: The geologic setting is characterized by thick beds of ash flow tuffs and volcanic deposits northwest of southern Nevada, and north-south trending mountain ranges composed of sedimentary rocks southwest of the area. The maximum credible earthquake magnitude for the study area is approximately 7.75, and young faults have been identified in the area. Debris flows are common along mountain fronts near the apex of alluvial fans, and along channels on dissected alluvial fans. Ground subsidence occurs around groundwater pumping areas in the vicinity of Las Vegas and on Nellis Air Force Base. Sheet and channelized flooding have been identified as potential hazards in many of the alluvial valleys in the study area. A large number of mineral commodities have been identified, and active mining of several commodities on the Strategic and Critical Materials list occurs. Portions of the area are considered to be potentially valuable for oil and gas resources. Adequate supplies of common aggregate are available. Concrete-quality aggregate is extremely rare. Timber Mountain Caldera National Natural Landmark is located within the Nellis Air Force Range boundary. Areas of moderate to high potential for wind and sheet erosion are frequently associated with young alluvial fans and floodplains in the area.

TYPICAL ISSUES:

- o Public health and safety considerations due to active faulting and seismic effects.
- o Availability of concrete-quality aggregate.
- o Susceptibility of soils to wind erosion.

REGIONAL ENVIRONMENTAL ISSUE AREAS

SOUTH-CENTRAL NEW MEXICO

South-central New Mexico is being considered as a possible basing area for the Small Intercontinental Ballistic Missile (ICBM). Fort Bliss, Holloman Air Force Base, and White Sands Missile Range are Candidate Deployment Installations for the Hard Mobile Launcher in Random Movement basing mode, with support functions to be provided at one of these three bases. Fort Bliss is also under consideration as a separate alternative for basing of missiles in the Hard Silo in Patterned Array mode. The discussions that follow provide an overview of the regional environmental issue areas that are under consideration for south-central New Mexico using, as an example, the case where Holloman Air Force Base would serve as the support base.

SOCIOECONOMICS

AREAS OF INVESTIGATION: Regional Growth, and Associated Demands on Housing, Public Services, and Public Finance

DISCUSSION: The potential deployment areas for south-central New Mexico are dispersed over a six-county region with a 1984 population of almost 724,000. The population is expected to increase by 2.5 percent annually, reaching 1.1 million in the year 2000. The civilian labor force within the region reached about 276,000 in 1984 and is estimated to rise to 440,000 in the year 2000. The region's per capita income, adjusted for inflation, was $8,600 in 1984. It is projected to grow at an annual rate of 0.6 percent and reach $9,300 by the year 2000. The housing stock in Otero County, where Holloman Air Force Base is located, was estimated at 17,200 units in 1984. The vacancy rate was 5.8 percent with about 1,000 vacant units in 1984. Local public-sector employment in Otero County was 291 persons per 10,000 population, 12 percent below the state average. Education employment in 1982 was 135 per 10,000 population, compared to the state average of 151. School enrollments in 1985 declined to 8,600 students, suggesting available capacity for additional students. Police employment in 1982 was 23 per 10,000 population, which was slightly higher than the state average of 21. Per capita public expenditures and revenues of local governments in Otero County were $794 and $868 in 1984, respectively.

TYPICAL ISSUES:

- Availability of housing in Otero and Dona Ana counties, New Mexico, and El Paso County, Texas, where support bases could be located.
- Inadequate school capacities for project-related enrollment growth in some support base counties.
- Possible lags or shortfalls in local government revenues needed to finance services for proposed project personnel and dependents.

UTILITIES

AREAS OF INVESTIGATION: Demands on Utility Systems

DISCUSSION: Potable water treatment facilities for Alamogordo do not meet present peak demands and will need to increase by 26 percent to meet projected peak demands in the year 2000. Potable water and wastewater treatment facilities at Holloman Air Force Base are adequate to meet existing and future requirements. Wastewater treatment facilities for Alamogordo may require expansion to meet peak demands in the years 1990 and 2000. Solid waste disposal facilities are adequate and there should be no major impediments to the siting of additional or expanded facilities to meet future demands. El Paso Electric Company anticipates having adequate supply available to meet demands through the year 2005.

TYPICAL ISSUES:

- Suitable water treatment and distribution facilities to meet the growing needs of Alamogordo and Otero County.
- Adequacy of wastewater treatment facilities.

TRANSPORTATION

AREAS OF INVESTIGATION: Level of Service or Congestion on Regional Transportation Networks

DISCUSSION: The primary road network in the study area includes three north-south routes: Interstates 10 and 25 and U.S. 54; and four east-west access routes: Interstate 10 and U.S. 62/180, 70/82, and 380. Main access to Holloman Air Force Base and White Sands Missile Range is provided by U.S. 70/82. Access to Fort Bliss is provided by U.S. 54 and 62/180 and Interstate 10. Rail service within the area is provided along the eastern boundary of Holloman Air Force Base and White Sands Missile Range, and through the center of Fort Bliss. Rail access is also provided in the southern and western portions of the area. Major airline service within the area is available at El Paso, Texas, with commuter service available at Alamogordo and Las Cruces in the central and southwest portions. The largest communities in the area are El Paso, Texas (1980 census population of 425,259); Las Cruces, New Mexico (45,086); and Alamogordo, New Mexico (24,024).

TYPICAL ISSUES:

- Increased congestion and decreased level of service due to workers commuting on primary roads such as Interstate 10 and U.S. 54 and 70/82.

LAND USE

AREAS OF INVESTIGATION: Existing Land Use Plans and Policies, Regional Recreation, and Visual Resources

DISCUSSION: The south-central New Mexico region includes three government reservations, and one Texas and five New Mexico counties. About 99 percent of

the approximately 1,120,000-acre Fort Bliss is used for training and maneuver areas. The Fort Bliss cantonment areas include about 11,000 acres, with ample space for facility expansion. White Sands Missile Range is used primarily for firing ranges and impact areas. Holloman Air Force Base contains little or no area for mission expansion. About 75 percent of Fort Bliss is land withdrawn from the public domain, with most of the remainder owned in fee by the Army (including all of the cantonment area). About 70 percent of the approximately 1,874,700-acre White Sands Missile Range has been withdrawn from the public domain. Most nonmilitary land in the ROI is used for low density agriculture. Otero County does not have a general plan, but the City of Alamogordo does. It designates appropriate locations for city expansion and future land uses. Five federal and eight state recreation areas fall within the area, and include the Lincoln and Gila national forests. Visual resources of the region include the White Sands National Monument and the Organ Mountains east of Las Cruces.

TYPICAL ISSUES:

- Possible use of agricultural lands for Hard Silo basing in western Texas and south-central New Mexico.
- Increased pressure on community planning activities in El Paso, Otero, and Dona Ana counties.
- Increased use of regional recreation areas, such as the Lincoln and Gila national forests.
- Potential changes in the visual resources environment in western Texas and south-central New Mexico.

CULTURAL AND PALEONTOLOGICAL RESOURCES

AREAS OF INVESTIGATION: Cultural and Paleontological Resources of the Region

DISCUSSION: Previous research on Fort Bliss and White Sands Missile Range includes partial field surveys and extensive archival and literature searches; no cultural resources have been identified on Holloman Air Force Base. The resource base includes prehistoric and historic archaeological sites, historic structures, a segment of the Butterfield Stage Line, and paleontological sites. Many cultural resources have been recorded, ranging from over 10,000 sites on Fort Bliss to over 2,000 on White Sands Missile Range. Existing information is representative of the types and densities of cultural resources likely to be discovered in the future. Cultural resource concerns in the area include potential damage to archaeological sites, impacts on areas of sacred or ceremonial importance to American Indian groups, and paleontological resources.

TYPICAL ISSUES:

- Potential disturbance to National Register of Historic Places eligible sites in south-central New Mexico.

- o Potential conflicts with locations important to American Indians for religious or economic uses.

- o Potential disturbance to paleontological deposits on White Sands Missile Range.

BIOLOGICAL RESOURCES AND THREATENED AND ENDANGERED SPECIES

AREAS OF INVESTIGATION: Regional Vegetation, Wildlife, Aquatic Habitats, Unique and Sensitive Habitats, and Threatened and Endangered Species

DISCUSSION: The vegetation and wildlife in south-central New Mexico are those common to the Chihuahuan Desert. Grassland and desert scrub communities dominate the area. Wildlife species present include pronghorn antelope, mule deer, fox, quail, and roadrunner. Springs, marshes, and rivers, including the Rio Grande, provide important aquatic habitats in and near the area. Rare biological communities and some recreational opportunities are provided by habitats of sand dunes, lava flows, springs, and mountains in the region. No federally listed threatened or endangered species occur in the area; however, state-protected species are present. Federally listed species occur in lands adjacent to the area. The proposed project area is expected to experience modest development and population growth, regardless of whether the project is implemented. This will likely result in increased pressure on biological resources of the area.

TYPICAL ISSUES:

- o Potential disturbance of Chihuahuan Desert vegetation and wildlife habitat.

- o Possible disturbance of biological resources of spring, creek, and riparian habitats such as those of Salt Creek, Malpais Spring, and Lost River.

- o Proximity of the proposed project to San Andres National Wildlife Refuge and Jornada Experimental Range.

- o Potential effects on habitat of the White Sands pupfish, Todsen's pennyroyal, and other protected species of the area.

AIR QUALITY AND NOISE

AREAS OF INVESTIGATION: Air Quality and Visibility Conditions and Noise Levels

DISCUSSION: The region lies at an elevation of about 4,000 feet in the arid area of south-central New Mexico. In the spring, strong winds create blowing dust that can reduce the normal 50-mile visibility to 6 miles or less. Average annual winds are about 10 miles per hour. Summer thunderstorms can be intense with heavy rain and an associated flash flood potential. Air quality data from the El Paso nonattainment area indicate general violations of total suspended particulates standards in El Paso, which also has sections where the carbon monoxide standards are not met. Environmental Protection Agency designated Class I areas occur within the study area. Other sensitive areas lie farther east of the region. No major changes in air quality are forecast.

Noise sources, sound propagation, and community sensitivity are not problems in the area and are not expected to be in the future.

TYPICAL ISSUES:

- Possible changes in the good regional visibility in south-central New Mexico.
- Short-term air quality degradation during construction.
- Possible changes in air quality and visibility conditions in the Class I areas in the region.
- Possible delays in meeting Environmental Protection Agency mandated air quality levels in the El Paso nonattainment area.
- Possible short-term increases in noise levels due to construction activities.

WATER RESOURCES

AREAS OF INVESTIGATION: Availability of Surface Water and Groundwater and Water Quality Conditions

DISCUSSION: Desert conditions generally prevail throughout this area, and there are few perennial streams. The dominant surface water feature is the Rio Grande River, which provides most of the regional water supply. The major location of water use is within, and adjacent to, the Rio Grande River Valley. Agriculture accounts for the majority of water use, including about 90 percent of the surface water diversions, which were about 700,000 acre-feet per year in 1984. In contrast, about 90 percent of the 200,000 acre-feet per year of municipal and industrial use came from groundwater sources. As a result, portions of the area have experienced substantial groundwater declines. Marginal to good quality water can generally be found throughout the area, except in the Tularosa Basin where most of the water is highly saline. A rapidly increasing population and its attendant water demands is projected to accelerate these groundwater declines in several basins.

TYPICAL ISSUES:

- Potential alteration in surface drainage patterns (Hard Silo).
- Possible interference and/or elimination of existing water users.
- Groundwater withdrawal from heavily overdrafted basins.
- Decline in groundwater quality due to the proposed project, particularly in the Tularosa Basin.
- Potential for development of new water sources, particularly the abundant saline groundwater in the Tularosa Basin.
- Compliance of the proposed project with state water law.

GEOLOGY AND SOILS

AREAS OF INVESTIGATION: Engineering Geologic Conditions Including Potential Geologic Hazards and Conditions of Geologic Materials, Regional Energy and Mineral Resources, and Soil Resources

DISCUSSION: Mountain ranges in the south-central New Mexico region generally trend north-south. As is typical of most valleys within the Basin and Range Physiographic Province, intermittent playas and sand dunes (e.g., White Sands National Monument) are common. Active faults and young volcanism indicate the study area is tectonically active. Areas susceptible to debris flows, rock falls, and landslides occur within the region. Several minerals on the Strategic and Critical Materials list have been found in the area, with active mining of some of these commodities. The energy resources within the proposed project area include geothermal, oil, gas, and coal. No production of oil, gas, or geothermal resources has occurred, but the area is being actively explored. It is likely that sufficient quantities of concrete-quality aggregate are available within or adjacent to the proposed project area. Important farmlands are located along the Rio Grande River. Soils highly susceptible to wind and sheet erosion are typically found on young alluvial fans, terraces, floodplains, and playas.

TYPICAL ISSUES:

- Seismicity and faulting in the Tularosa and Hueco basins.
- Availability of concrete-quality aggregate.
- Susceptibility of soils to wind and sheet erosion in the basin areas.

REGIONAL ENVIRONMENTAL ISSUE AREAS

SOUTH-CENTRAL CALIFORNIA

South-central California is being considered as a possible basing area for the Small Intercontinental Ballistic Missile (ICBM). China Lake Naval Weapons Center, Edwards Air Force Base, Fort Irwin National Training Center, and Twentynine Palms Marine Corps Air-Ground Combat Center are Candidate Deployment Installations for the Hard Mobile Launcher in Random Movement basing mode, with support functions to be provided at either Edwards Air Force Base or Fort Irwin National Training Center. Edwards Air Force Base is also under consideration as a separate alternative for basing of missiles in the Hard Silo in Patterned Array mode. The discussions that follow provide an overview of the regional environmental issue areas that are under consideration for south-central California using, as an example, the case where Edwards Air Force Base would serve as the support base.

SOCIOECONOMICS

AREAS OF INVESTIGATION: Regional Growth, and Associated Demands on Housing, Public Services, and Public Finance

DISCUSSION: The potential deployment areas for south-central California are dispersed over a five-county region with a 1984 population of 10.2 million. The population is expected to increase by 1.0 percent annually to 11.9 million in the year 2000. The civilian labor force within the region reached 4.7 million in 1984 and is estimated to rise to about 5.9 million in the year 2000. The region's per capita income, adjusted for inflation, was $13,400 in 1984. It is forecast to grow at an annual rate of 0.3 percent and will reach $14,000 in the year 2000. The housing stock in Los Angeles County, the county most likely to be affected by the activities at Edwards Air Force Base, was estimated at 3.0 million units. The vacancy rate was 2.8 percent, with about 84,400 vacant units in 1984. In the vicinity of Edwards Air Force Base, there were 114,800 total housing units in 1984 with a vacancy rate of 6.0 percent, resulting in about 6,900 vacant units in 1984. Local public-sector employment in Los Angeles County was 356 persons per 10,000 population, 2.3 percent above the state average in 1982. Education employment in 1982 was 103 per 10,000 population, compared to the state average of 110. School enrollments in 1985 reached 1.24 million students in the county and 60,400 in the Edwards Air Force Base vicinity, suggesting no current available capacity. Police employment in 1982 was 28 per 10,000 population, compared to the state average of 24. Per capita public expenditures and revenues of local governments in Los Angeles County were $2,059 and $2,189 in 1984, respectively.

TYPICAL ISSUES:

- Availability of short-term and long-term housing close to Edwards Air Force Base in northeastern Los Angeles and southeastern Kern counties.

- o Adequacy of local area school capacity given recent enrollment growth in the vicinity of the base.

- o Induced growth in local government expenditures to provide services to added population, and potential lags or shortfalls in revenues to finance these expenditures.

UTILITIES

AREAS OF INVESTIGATION: Demands on Utility Systems

DISCUSSION: Potable water treatment facilities in the communities surrounding Edwards Air Force Base and on the base itself are presently adequate. To meet the growing needs of the base, further expansion and improvement of the water supply system will be required. Wastewater treatment facilities at Edwards Air Force Base and in the Los Angeles County Sanitary District are all operating at or over their design capacities. A program to improve the operation of the facility at Edwards Air Force Base is underway; however, additional capacity is not programmed under this upgrade. The design of larger facilities for the district is ongoing and may meet the increased demands of the area. The solid waste and energy infrastructure proposed for Edwards Air Force Base and the surrounding region is adequate to meet existing and future demands.

TYPICAL ISSUES:

- o Adequacy of water treatment and distribution systems to meet the growing needs of Los Angeles County's desert region, including Edwards Air Force Base.

- o Sufficient wastewater treatment capacity to serve Lancaster and Palmdale.

TRANSPORTATION

AREAS OF INVESTIGATION: Level of Service or Congestion on Regional Transportation Networks

DISCUSSION: The primary road network in the study area includes five major north-south roads (Interstate 15, U.S. 395, and California State Highways 14, 111, and 247) and eight major east-west roads (Interstates 10 and 40 and California State Highways 18, 58, 62, 138, 178, and 190). Rail service is available throughout the region, with main line service to Edwards Air Force Base and adjacent to Twentynine Palms Marine Corps Air-Ground Combat Center and Fort Irwin National Training Center. Spur service is also available adjacent to China Lake Naval Weapons Center. Major airline service is available from Palm Springs and Inyokern, California, with commuter service available at Palmdale/Lancaster, California. The largest communities in the area are Lancaster (1980 census population of 48,027), Palm Springs (32,271), Barstow (17,690), Saugus-Bouquet Canyon census designated place (16,283), and Ridgecrest (15,929), all in California.

TYPICAL ISSUES:

- Increased congestion and decreased level of service due to workers commuting on primary roads such as California State Highways 14 and 58 and U.S. 395.

LAND USE

AREAS OF INVESTIGATION: Existing Land Use Plans and Policies, Regional Recreation, and Visual Resources

DISCUSSION: The south-central California region includes China Lake Naval Weapons Center, Edwards Air Force Base, Fort Irwin National Training Center, and Twentynine Palms Marine Corps Air-Ground Combat Center in four California counties. China Lake Naval Weapons Center has about 1,096,500 acres and Edwards Air Force Base contains 300,700 acres. Edwards Air Force Base is used primarily for exercise and target ranges with only a small percentage used for cantonment facilities. The 680,000-acre Fort Irwin National Training Center is used for ground combat and air-to-ground training. The 596,300-acre Twentynine Palms Marine Corps Air-Ground Combat Center is used for Marine combat training. Each of the four counties in which the bases are located has adopted plans and policies for the development of land in the vicinity of the bases. These plans would retain large acreage lots and encourage future development in already urbanized areas. Regional recreation areas include Joshua Tree National Monument, six national forests, and several California state parks and recreation areas. The terrain is dominated by Joshua tree forests.

TYPICAL ISSUES:

- Possible use of agricultural lands for Hard Silo basing in Los Angeles, Kern, and San Bernardino counties.
- Increase in community planning activities in the region's counties.
- Increased use of regional recreation areas, such as the Joshua Tree National Monument.
- Potential changes in the visual environment in Los Angeles, Kern, and San Bernardino counties.

CULTURAL AND PALEONTOLOGICAL RESOURCES

AREAS OF INVESTIGATION: Cultural and Paleontological Resources of the Region

DISCUSSION: The cultural resource base includes prehistoric and historic archaeological sites, historic structures, mines, trails, Pleistocene fossiliferous deposits, and American Indian sacred sites. Fort Irwin National Training Center is concluding a major investigation of onbase archaeological resources. Overviews have been produced for China Lake Naval Weapons Center and Edwards Air Force Base. No formal archaeological investigation has been carried out on Twentynine Palms Marine Corps Air-Ground Combat Center. Existing information is adequate to make general statements about the prehistoric

and historic data base. Cultural resource concerns include potential damage to unrecorded archaeological sites and historic structures, paleontological sites, and sacred areas important to American Indians.

TYPICAL ISSUES:

- o Potential disturbance to National Register of Historic Places eligible prehistoric or historic sites in south-central California.
- o Potential conflicts with localities important to American Indians for religious or economic uses.

BIOLOGICAL RESOURCES AND THREATENED AND ENDANGERED SPECIES

AREAS OF INVESTIGATION: Regional Vegetation, Wildlife, Aquatic Habitats, Unique and Sensitive Habitats, and Threatened and Endangered Species

DISCUSSION: Vegetation and wildlife in the south-central California region are representative of the Mojave Desert, which is dominated by large areas of creosote bush and bursage. Wildlife species present include desert bighorn sheep, deer, burros, mountain lion, golden eagle, waterfowl, and desert tortoise. Although no major aquatic habitats are located in the region, small aquatic habitats are found by springs and temporary ponds. Recreational opportunities existing near the area include the California Desert Conservation Area, the Mojave Desert, dry lakes, and lava flows in which unique and sensitive habitats have been identified. Only one endangered species, the Mohave chub, is known to occur in the area. Increased impacts to the biological resources of the area are expected regardless of whether the proposed project is implemented, since considerable development and population growth is expected in the coming years.

TYPICAL ISSUES:

- o Possible disturbance of Mojave Desert vegetation and wildlife habitat, including riparian and desert wash habitat.
- o Possible disturbance of desert bighorn sheep and other sensitive wildlife species.
- o Potential effects on desert spring and playa habitats and species.
- o Proximity of the proposed project to habitat of the Mohave chub, desert tortoise, and other protected species.

AIR QUALITY AND NOISE

AREAS OF INVESTIGATION: Air Quality and Visibility Conditions and Noise Levels

DISCUSSION: This region is located in the Mojave Desert. While occasional periods of blowing dust occur, annual wind speeds average only 8 miles per hour or less from the southwest. Visibility varies from a reduced value of 40 to 45 miles in the southern reaches of the area to 60 miles or better in the northern portion. Total suspended particulates standards are violated in

most locations at some time during the year. Carbon monoxide is not a problem even in the larger communities. Twelve protected wilderness areas (Environmental Protection Agency designated Class I) lie on all sides of the region; however, most are in the mountains, away from areas the proposed project is likely to disturb. Visibility and air quality may continue to suffer from gradual urban encroachment in the southern part of the study area. Noise sources on the various military bases, sound propagation, and community noise sensitivity are not problems in the area and are not expected to be in the future.

TYPICAL ISSUES:

- o Possible additional changes to the reduced visibility within the region's southern sector.
- o Short-term degradation of air quality during construction.
- o Possible effects of additional total suspended particulates on the Class I (wilderness) areas surrounding the proposed project area.

WATER RESOURCES

AREAS OF INVESTIGATION: Availability of Surface Water and Groundwater and Water Quality Conditions

DISCUSSION: The major perennial surface stream in the south-central California region is the upper stretch of the Mojave River. Groundwater supplies about two-thirds of the total water demand. Although locally variable, groundwater quality is generally good in areas located away from the dry lakes in the region. Imported water from the California Aqueduct of the State Water Project comprises about one-third of the total water supply. Imported water will supply an increasing percentage of the total water demand to the region in the future. Seventy-eight percent of the 353,000 acre-feet of water used in the South Lahontan region in 1980 went to agricultural uses. Municipal and industrial water use was 16 percent, while miscellaneous uses totaled 6 percent. Agricultural demands are expected to decrease by one-third by the year 2000. Municipal demand is expected to double. The combined effect will be a lower overall water usage in the region.

TYPICAL ISSUES:

- o Groundwater withdrawal from overdrafted basins, particularly Antelope Valley.
- o Possible water quality degradation in groundwater basins.
- o Potential alteration of surface drainage patterns (Hard Silo).
- o Extension of State Water Project to the Twentynine Palms area for proposed project water supply.

GEOLOGY AND SOILS

AREAS OF INVESTIGATION: Engineering Geologic Conditions Including Potential Geologic Hazards and Conditions of Geologic Materials, Regional Energy and Mineral Resources, and Soil Resources

DISCUSSION: The mountain ranges in the south-central California region consist of granitic intrusive rocks, uplifted into fault block mountains. The San Andreas and Garlock faults, which bound the Mojave Desert on the southwest and northwest, respectively, are the major faults in the region. Many northwest-southeast trending strike-slip faults parallel the San Andreas Fault zone. The maximum credible earthquake for the Mojave Desert area is estimated to have a magnitude of 8.5. Areas susceptible to ground subsidence due to groundwater withdrawal and mass movements (e.g., debris flows) also exist in the proposed project area. Several occurrences of commodities or raw materials on the Strategic and Critical Materials list have been documented and active mining districts exist for select commodities in the region. Geothermal resources are the identified energy resources in the area. Concrete-quality aggregate is extremely rare in the region. Important farmlands occur in the proposed project area. Areas of high to moderate potential for wind and sheet erosion are frequently associated with the young alluvial fans and floodplains of the area.

TYPICAL ISSUES:

- Public health and safety considerations due to faulting and seismic effects in the Mojave Desert and adjacent regions.
- Conflict with geothermal resource development in the China Lake Naval Weapons Center.
- Conflicts with important farmlands in the western Mojave Desert area.

REGIONAL ENVIRONMENTAL ISSUE AREAS

SOUTH-CENTRAL WASHINGTON

South-central Washington is being considered as a possible basing area for the Small Intercontinental Ballistic Missile (ICBM). The Department of Energy Hanford Site and Yakima Firing Center are Candidate Deployment Installations for the Hard Mobile Launcher in Random Movement basing mode, with support functions to be provided at Yakima Firing Center. The discussions that follow provide an overview of the regional environmental issue areas that are under consideration for south-central Washington.

SOCIOECONOMICS

AREAS OF INVESTIGATION: Regional Growth, and Associated Demands on Housing, Public Services, and Public Finance

DISCUSSION: The potential deployment areas for south-central Washington are dispersed over a six-county region with a 1984 population of 412,200. The population is expected to increase by 1.2 percent annually, to 495,100 in the year 2000. The civilian labor force within the region reached nearly 200,000 in 1984 and is expected to grow to about 268,000 in the year 2000. The region's per capita income, adjusted for inflation, was $11,900 in 1984. It is projected to grow at an average annual rate of 0.4 percent and reach $12,600 in the year 2000. The housing stock in Yakima County, where Yakima Firing Center is located, was estimated at 66,500 units in 1984. The vacancy rate was 3.8 percent, with about 2,500 vacant units in 1984. Local public-sector employment in Yakima County was 273 persons per 10,000 population, 7.1 percent below the state average in 1982. Education employment in 1982 was 111 per 10,000 population, compared to the state average of 95. School enrollments declined to 35,200 in 1985, suggesting some current available capacity. Police employment in 1982 was 17 per 10,000 population, which was equal to the state average. Per capita public expenditures and revenues of local governments in Yakima County were $1,138 and $1,160 in 1984, respectively.

TYPICAL ISSUES:

- Added population in the region.
- Potential shortfalls in Yakima County housing which will be needed for the relocating population during the growth phase of the proposed project, and possible increases in vacancies after peak demands have passed.
- Possible needs to add public service personnel (e.g., for education and police protection) to support population growth.
- Potential lags or shortfalls in revenues needed to finance added services in Yakima County jurisdictions.

UTILITIES

AREAS OF INVESTIGATION: Demands on Utility Systems

DISCUSSION: Potable water treatment facilities are presently meeting the demands of the existing Yakima County population. Demands created by future populations should be met by existing or programmed facilities. Wastewater treatment facilities are adequately processing current wastewater flows. To meet the needs of future populations, expansions of the smaller facilities in the county may be necessary. Solid waste facilities will be adequate to handle waste from the region through the year 2000. Electric power and natural gas supplies will continue to be available to meet the projected demands in the year 2000.

TYPICAL ISSUES:

- Capacity of water treatment facilities to meet long-term growth projections.
- Adequacy of wastewater treatment facilities in Yakima County.

TRANSPORTATION

AREAS OF INVESTIGATION: Level of Service or Congestion on Regional Transportation Networks

DISCUSSION: The primary road network in the study area includes four major east-west highways (Interstate 90, U.S. 12, and Washington State Highways 24 and 26) and seven major north-south highways (Interstate 82, U.S. 97 and 395, and Washington State Highways 17, 240, 241, and 243). Access to Yakima Firing Center is provided by Interstate 82, while access to the Department of Energy Hanford Site is provided by Washington State Highway 240, which passes through the installation. Rail service is available in the eastern, southern, and western portions, with adjacent service along the western border of Yakima Firing Center and direct access to the Department of Energy Hanford Site. Major airline service is available throughout the area at Yakima, Wenatchee, Pasco, and Walla Walla, with commuter service available at Moses Lake, Washington. The largest communities in the area are Yakima (1980 census population of 49,826), Kennewick (34,397), Richland (33,578), and Walla Walla (25,618), Washington.

TYPICAL ISSUES:

- Increased congestion and decreased level of service due to workers commuting on primary roads, such as Washington State Highways 24, 240, 241, and 243, and sections of Interstates 82 and 90 near Yakima Firing Center.

LAND USE

AREAS OF INVESTIGATION: Existing Land Use Plans and Policies, Regional Recreation, and Visual Resources

DISCUSSION: The south-central Washington region contains Yakima Firing Center and the Department of Energy Hanford Site, and is located in five Washington counties: Yakima, Franklin, Kittitas, Benton, and Grant. Yakima Firing Center has about 261,500 acres and the Department of Energy Hanford Site has 359,000 acres. Only about 11 percent of Yakima Firing Center is withdrawn from the public domain; the remainder is fee-owned by the Department of Defense. At the Department of Energy Hanford Site, about 89 percent of the land is Department of Energy fee-owned and most of the remainder is withdrawn from the public domain (through the Bureau of Reclamation). Both Yakima County and the cities of Yakima and Union Gap have general plans that call for the preservation of agriculture and encourage future development where public services already exist. Regional recreation areas include Mount Rainier National Park, Coulee Dam National Recreation Area, four national forests, and numerous Washington state parks. The visual resources of the Yakima/Hanford area consist of shrub and grass cover.

TYPICAL ISSUES:

- Increased pressure on community planning activities in Yakima and Benton counties.
- Increased use of regional recreational areas, such as Mount Rainier National Park.
- Potential changes to the visual environment in Yakima and Benton counties.

CULTURAL AND PALEONTOLOGICAL RESOURCES

AREAS OF INVESTIGATION: Cultural and Paleontological Resources of the Region

DISCUSSION: The cultural resource base includes prehistoric and historic archaeological sites, historic districts, historic structures, American Indian sacred areas, and an important paleontological site. A small percentage of the south-central Washington region has been studied using archival sources, field surveys, and excavation techniques. American Indian groups still use portions of the area for traditional sacred activities. Important paleontological resources occur in the northeastern portion of Yakima Firing Center. Existing information can be used to make general statements about cultural resources in the area. Cultural resource concerns include potential damage to historic structures, sacred areas important to American Indians, and unrecorded archaeological and paleontological sites.

TYPICAL ISSUES:

- Potential disturbance to National Register of Historic Places eligible sites in south-central Washington.

- o Potential conflicts with locations important to American Indians for religious or economic uses.

- o Potential damage to paleontological resources.

BIOLOGICAL RESOURCES AND THREATENED AND ENDANGERED SPECIES

AREAS OF INVESTIGATION: Regional Vegetation, Wildlife, Aquatic Habitats, Unique and Sensitive Habitats, and Threatened and Endangered Species

DISCUSSION: The south-central Washington region lies within the shrub-steppe region of the Columbia River Basin, with the predominant natural vegetation type being big sagebrush-dominated shrubland. Much of the native vegetation has been converted to agriculture and grazing. Notable wildlife species are mule deer, pronghorn antelope, black bear, various furbearers, upland game species, and waterfowl. Major aquatic habitats in the area occur along the Columbia, Yakima, and Snake rivers, which also support anadromous fish populations. Several sensitive wetland habitats occur on Yakima Firing Center. The Department of Energy Hanford Site contains the Arid Lands Ecology Reserve, a national wildlife refuge, and a state game recreation area. No federal endangered or threatened species occur on either installation, but the bald eagle and peregrine falcon are migratory in the area. This area is expected to experience little additional development and population growth in the coming years if the proposed project is not implemented. This is likely to result in minimal additional pressure to and degradation of biological resources.

TYPICAL ISSUES:

- o Potential disturbance of the shrub-steppe vegetation and wildlife habitat of the Columbia River Basin.

- o Proximity of the proposed project to wetlands, waterfowl habitat, and anadromous and freshwater fisheries of the Columbia River Basin.

- o Proximity of the proposed project to Saddle Mountain National Wildlife Refuge, Arid Lands Ecology Reserve, and Wahluke Slope State Wildlife Recreation Area.

- o Possible effects on the bald eagle, peregrine falcon, and other threatened and endangered species of the area.

AIR QUALITY AND NOISE

AREAS OF INVESTIGATION: Air Quality and Visibility Conditions and Noise Levels

DISCUSSION: This area is surrounded by mountains that provide both wind and temperature protection. Visibility averages 60 miles and total suspended particulates levels are within established limits nearly all of the time. With light winds in winter, air stagnation occurs and carbon monoxide levels occasionally build up and exceed standards in urban areas. Three protected wilderness areas lie in the mountains 40 to 90 miles west of the region. Population growth could cause air quality to degrade as urban areas expand,

and some decrease in visibility may occur as particulate levels increase. Noise sources, sound propagation, and community noise sensitivity are not problems in the area and are not expected to be so in the future.

TYPICAL ISSUES:

- o Possible changes in the good regional visibility.
- o Possible aggravation of carbon monoxide build-up in periods of air stagnation.
- o Short-term degradation of air quality during construction.

WATER RESOURCES

AREAS OF INVESTIGATION: Availability of Surface Water and Groundwater and Water Quality Conditions

DISCUSSION: Although runoff in this region is sparse, the area has abundant supplies of excellent quality surface water available from three large rivers. This is augmented by the availability of good-quality groundwater under most of the area, although much of it lies at a considerable depth. The great majority of the 3.9 million acre-feet of water used is attributable to agricultural and industrial use. Agricultural use will continue to increase, supported by surface water sources. The water supplies of the federal installations and their support communities are adequate to meet anticipated growth.

TYPICAL ISSUES:

- o Potential surface and groundwater quality degradation.
- o Compliance of the proposed project with state water law.

GEOLOGY AND SOILS

AREAS OF INVESTIGATION: Engineering Geologic Conditions Including Potential Geologic Hazards and Conditions of Geologic Materials, Regional Energy and Mineral Resources, and Soil Resources

DISCUSSION: Topography in the south-central Washington region is controlled by east-west oriented bedrock ridges extending east from the Cascade Range that are separated by sediment-filled valleys. Both the Columbia and Yakima rivers have incised valleys across the ridges. The maximum credible earthquake magnitude for the Columbia Plateau Seismic Region is estimated to be 6.0. Irrigation practices have initiated mass movements in select localities. Geologic hazards due to sheet flooding and volcanic ash-fall also occur in the proposed project area. No strategic and critical materials have been identified in the region and energy and other mineral resources are generally absent. Suitable aggregate for concrete is available. Important farmlands are located along the Columbia River. Upland areas and floodplains are moderately or highly susceptible to wind or sheet erosion.

TYPICAL ISSUES:

- Public health and safety considerations as the result of volcanic eruption in the Cascade Mountains.
- Soils moderately to highly sensitive to sheet and wind erosion.

REGIONAL ENVIRONMENTAL ISSUE AREAS

WESTERN SOUTH DAKOTA

Western South Dakota is being considered as a possible basing area for the Small Intercontinental Ballistic Missile (ICBM) in the Hard Mobile Launcher at Minuteman Facilities basing mode at Ellsworth Air Force Base. The discussions that follow provide an overview of the regional environmental issue areas that are under consideration for western South Dakota.

SOCIOECONOMICS

AREAS OF INVESTIGATION: Regional Growth, and Associated Demands on Housing, Public Services, and Public Finance

DISCUSSION: Ellsworth Air Force Base, its associated Minuteman launch facilities, and immediately adjacent communities are located in an eight-county region with a 1984 population of 143,700. The population is expected to increase by 1.1 percent annually, to 169,900 by the year 2000. The civilian labor force within the region increased to about 71,000 in 1984 and is expected to reach nearly 91,000 in the year 2000. The region's per capita income, adjusted for inflation, was $10,800 in 1984. It is projected to grow at an annual rate of 0.5 percent and reach $11,587 in the year 2000. The housing stock in Pennington County, the county most likely to be affected by the activities at Ellsworth Air Force Base, was estimated at 28,220 units in 1984. The vacancy rate was 5.7 percent with about 1,600 vacant units in 1984. Local public-sector employment in Pennington County was 298 persons per 10,000 population, 6.0 percent below the state average in 1982. Education employment in 1982 was 141 per 10,000 population, compared to the state average of 146. School enrollments in 1985 reached 15,200 students, suggesting no current available capacity. Police employment in 1982 was 21 per 10,000 population, compared to the state average of 17. Per capita public expenditures and revenues of local governments were $1,051 and $1,165 in 1984, respectively.

TYPICAL ISSUES:

- Rapid growth and decline of construction-related population and employment in a generally static economic area.
- Short-term demand and development of additional housing units that will not be needed by either the baseline or project population during the operations phase.
- Increased demand for public services including education and police requiring additional staff and facilities that generally will not be needed by either the baseline or project population during the operations phase.
- Need for capital improvement funds in the early project years will likely exceed the added revenues induced by the proposed project.

UTILITIES

AREAS OF INVESTIGATION: Demands on Utility Systems

DISCUSSION: The Rapid City water treatment and distribution system should be adequate through the year 2000 since the city has access to surface water supplies to meet future baseline growth and peak demands. Smaller systems in the area currently require expansion to meet baseline needs. Wastewater treatment systems are meeting the present needs and should be able to absorb future growth without expansion. Solid waste disposal is handled by a regional facility with available capacity through the year 2000. Electric power and natural gas supplies are currently meeting the needs of the region. To meet the demands of future growth, Black Hills Power and Light Company will rely, to a greater extent, on supplies of power purchased from outside the region.

TYPICAL ISSUES:

- Acceptable water treatment and distribution systems for communities other than Rapid City.
- Capacity of the electric power system to meet long-term growth forecasts.

TRANSPORTATION

AREAS OF INVESTIGATION: Level of Service or Congestion on Regional Transportation Networks

DISCUSSION: The primary road network in the study area includes five major east-west roads (Interstate 90, U.S. 14 and 212, and South Dakota State Highways 34 and 44) and four major north-south roads (U.S. 85 and 385 and South Dakota State Highways 73 and 79). Rail service is available only in the southern section of the area from two Class I railroads. A spur from the Chicago and North Western Transportation Company serves Ellsworth Air Force Base. Major airline service is available at Rapid City and Pierre, South Dakota. The largest population centers in the region include Rapid City (1980 population of 46,492), Pierre (11,973), Spearfish (5,251), and Sturgis (5,184).

TYPICAL ISSUES:

- Increased congestion and decreased level of service due to workers commuting on primary roads such as Interstate 90 (through Spearfish and Rapid City) and sections of U.S. 85 and 212.

LAND USE

AREAS OF INVESTIGATION: Existing Land Use Plans and Policies, Regional Recreation, and Visual Resources

DISCUSSION: Ellsworth Air Force Base, consisting of 4,860 acres, is located in Meade and Pennington counties, South Dakota. It is responsible for the operation and maintenance of 150 Minuteman II launch facilities and 15 launch

control facilities. These are scattered over approximately 13,500 square miles in western South Dakota. Lands onbase are Department of Defense fee-owned with offbase land use predominantly agricultural. Although Pennington County does not have a general plan, the City of Rapid City did adopt a plan in 1980. It proposes that future residential/commercial development be located south and east of the city (away from Ellsworth Air Force Base). Regional recreation areas in the vicinity of Ellsworth Air Force Base include 4 national parks, forests, and monuments, and 12 state parks and recreation areas, including Badlands National Park. The relatively flat terrain is mostly grassland with deciduous trees found along stream areas.

TYPICAL ISSUES:

- o Possible use of agricultural lands in the vicinity of launch control facilities in several western South Dakota counties.
- o Increased pressure on community planning activities in Pennington County.
- o Increased use of regional recreation areas such as the Badlands National Park.
- o Potential changes in the visual environment in western South Dakota.

CULTURAL AND PALEONTOLOGICAL RESOURCES

AREAS OF INVESTIGATION: *Cultural and Paleontological Resources of the Region*

DISCUSSION: The cultural resource base includes prehistoric and historic archaeological sites, American Indian burial and sacred areas, and paleontological localities. Previous research in the area consists of small block inventories and a larger inventory along the Belle Fourche River. Existing information may not be representative of the types and densities of cultural resources in the general area. Cultural resource concerns include potential impacts to unrecorded prehistoric and historic archaeological sites, sacred areas important to American Indians, and paleontological sites.

TYPICAL ISSUES:

- o Potential disturbance to National Register of Historic Places eligible sites in western South Dakota.
- o Potential conflicts with locations important to American Indians for religious or economic uses.
- o Potential damage to paleontological sites.

BIOLOGICAL RESOURCES AND THREATENED AND ENDANGERED SPECIES

AREAS OF INVESTIGATION: Regional Vegetation, Wildlife, Aquatic Habitats, Unique and Sensitive Habitats, and Threatened and Endangered Species

DISCUSSION: Ellsworth Air Force Base lies on the western edge of the Great Plains. Predominant native vegetation is mixed midgrass and short-grass

prairie. Less native vegetation has been converted to agriculture than in eastern South Dakota. Notable wildlife of the area are mule deer, whitetail deer, elk, upland game, waterfowl, and various furbearers. Three lakes are maintained for fishing on the base. The surrounding region contains several major drainages supporting wetlands, and numerous streams and lakes support both coldwater and warmwater fisheries. Unique biological areas are found in the Black Hills and Badlands regions of South Dakota, and in the Sand Hills region of Nebraska. No federal endangered or threatened species are known to reside on Ellsworth Air Force Base, but three endangered species, the bald eagle, peregrine falcon, and whooping crane, are migratory in the vicinity. This area is expected to experience little growth and development in the coming years if the proposed project is not implemented. Minimal additional impact to biological resources of the area should occur as a result.

TYPICAL ISSUES:

- Potential minor disturbance of northern prairie grassland, agricultural land, and associated wildlife habitat.
- Proximity of the proposed project to prairie and mountain stream habitats.
- Proximity of the proposed project to unique biological habitats of the Black Hills and Badlands areas.
- Possible effects on the whooping crane, bald eagle, and other threatened or endangered species.

AIR QUALITY AND NOISE

AREAS OF INVESTIGATION: Air Quality and Visibility Conditions and Noise Levels

DISCUSSION: Ellsworth Air Force Base and the associated deployment area have mainly fair weather. The atmosphere is generally clear with visibility averaging about 85 miles. The air quality is excellent throughout the region due to the lack of pollutant sources in the mostly rural region. The only total suspended particulates nonattainment area is Rapid City, which is 10 miles west of the base. The base and the rest of the study area are in attainment status for all criteria pollutants. Future projections show no major regional air quality changes. Noise levels within the region average 33 to 35 decibels. Noise is not currently a problem and is not expected to be in the future.

TYPICAL ISSUES:

- Possible delays in meeting Environmental Protection Agency mandated air quality levels in the Rapid City area.
- Short-term degradation of air quality during construction.

WATER RESOURCES

AREAS OF INVESTIGATION: Availability of Surface Water and Groundwater and Water Quality Conditions

DISCUSSION: With the exception of the Black Hills area, good-quality water in the area is a limited resource. More often than not, both surface and groundwater contain high amounts of dissolved solids. Most of the water is used for agricultural purposes. Rapid City supplies Ellsworth Air Force Base from surface water sources. They have a combined consumption of 10,400 acre-feet. The Rapid City supply is considered to be adequate to meet anticipated needs through the year 2000.

TYPICAL ISSUES:

- o Surface water quality degradation due to construction activities in the deployment area.
- o Potential for development of a new water source: the ETSI water pipeline.
- o Proposed project demand may exceed the supply available to several of the smaller support communities.

GEOLOGY AND SOILS

AREAS OF INVESTIGATION: Engineering Geologic Conditions Including Potential Geologic Hazards and Conditions of Geologic Materials, Regional Energy and Mineral Resources, and Soil Resources

DISCUSSION: The geology of western South Dakota is dominated by the Black Hills Uplift. The topography of the deployment area consists of flat to rolling hills used mainly for rangeland. Areas subject to landsliding are located throughout the region. The deployment area lies in a region of low seismicity, but localized faulting with small displacements are common. The engineering characteristics of most soils have moderate to severe limitations for routine construction. Uranium occurs in the northwestern section and strippable coal reserves have been identified in the extreme northern part of the deployment area. Exploratory tests have indicated oil and gas are present, but there is no current production. No Known Geothermal Resource Areas exist, although scattered areas have shown potential for low-temperature geothermal resources. Aggregate for concrete and other construction purposes is available from stream deposits adjacent to the Black Hills. No prime farmland is identified, but most farmland is considered of statewide importance. Soils are moderately to highly susceptible to wind and sheet erosion.

TYPICAL ISSUES:

- o Landslides in the Pierre Hills area.
- o Availability of concrete-quality aggregate in the region.
- o Wind erosion in the Badlands north of the Belle Fourche River.

REGIONAL ENVIRONMENTAL ISSUE AREAS

SOUTHEASTERN WYOMING

Southeastern Wyoming is being considered as a possible basing area for the Small Intercontinental Ballistic Missile (ICBM) in the Hard Mobile Launcher at Minuteman Facilities basing mode at F.E. Warren Air Force Base. Some Minuteman facilities are located in parts of Colorado and Nebraska. F.E. Warren Air Force Base is also under consideration as a separate alternative for basing of missiles in the Hard Silo in Patterned Array mode. The discussions that follow provide an overview of the regional environmental issue areas that are under consideration for southeastern Wyoming.

SOCIOECONOMICS

AREAS OF INVESTIGATION: Regional Growth, and Associated Demands on Housing, Public Services, and Public Finance

DISCUSSION: F.E. Warren Air Force Base, its associated Minuteman launch facilities, and immediately adjacent communities are dispersed over a 12-county region in Wyoming, Nebraska, and Colorado, with a 1984 population of 502,600. The population is expected to increase by 2.4 percent annually, reaching 734,400 in the year 2000. The civilian labor force within the region increased to nearly 252,000 in 1984 and is expected to reach about 387,000 in the year 2000. The region's per capita income, adjusted for inflation, was $12,100 in 1984. Per capita income is projected to grow at an annual rate of 0.6 percent and reach $13,216 in the year 2000. The housing stock in Laramie County, where F.E. Warren Air Force Base is located, was estimated at 29,700 units in 1984. The vacancy rate was 4.0 percent with about 1,200 vacant units in 1984. Local public-sector employment in Laramie County was 446 persons per 10,000 population, 4.7 percent below the state average in 1982. Education employment in 1982 was 178 per 10,000 population, compared to the state average of 183. School enrollments in 1985 declined slightly to 13,600 students, suggesting minimal current available capacity. Police employment in 1982 was 24 per 10,000 population, compared to the state average of 30. Per capita public expenditures and revenues by local governments in Laramie County were $1,329 and $1,680 in 1984, respectively.

TYPICAL ISSUES:

- Increased demand for construction-related housing will cause rapid short-term development and potentially long-term excess housing units.
- Additional school enrollment during the construction phase will require additions of staff and facilities not generally needed by long-term population growth.
- Capital improvement programs for both municipal and education services will likely require levels of short-term funds beyond annual project-generated revenues.

UTILITIES

AREAS OF INVESTIGATION: Demands on Utility Systems

DISCUSSION: The potable water treatment system in Laramie County will have the necessary capacity to treat average day demands for water through the year 2000. Further expansion of the system may be required to meet peak demands after the year 1990. Wastewater treatment facilities presently under construction should be adequate through the late 1990s, when additional capacity may be required. Solid waste disposal will continue at the City of Cheyenne's facility through the year 2000. Electric and natural gas supplies should continue to meet the needs of the region.

TYPICAL ISSUES:

- Adequacy of existing water treatment and distribution systems to meet long-term growth requirements.
- Capacity of wastewater treatment facilities to meet future growth.

TRANSPORTATION

AREAS OF INVESTIGATION: Level of Service or Congestion on Regional Transportation Networks

DISCUSSION: The primary road network in the study area includes six east-west roads (Interstates 76 and 80; U.S. 26, 30, and 34; and Colorado State Highway 14) and five north-south routes (Interstate 25; U.S. 85, 287, and 385; and Colorado-Nebraska State Highway 71). Rail service is available throughout the area from four Class I and one Class II railroads. Commuter airline service is available from Cheyenne and Laramie, Wyoming in the west-central section of the area and from Scottsbluff, Alliance, and Sidney, Nebraska in the north-central study area. Major population centers in the region include Cheyenne (1980 population of 47,283) and Laramie (24,410), Wyoming; Scottsbluff (14,156), Nebraska; and Fort Collins (65,092), Greeley (53,006), and Loveland (30,244), Colorado.

TYPICAL ISSUES:

- Increased congestion and decreased level of service due to workers commuting on primary roads such as sections of Interstates 80 and 25 and U.S. 85.

LAND USE

AREAS OF INVESTIGATION: Existing Land Use Plans and Policies, Regional Recreation, and Visual Resources

DISCUSSION: F.E. Warren Air Force Base, consisting of about 5,820 acres, is located in Laramie County, Wyoming. It is responsible for the operation and maintenance of 200 Minuteman III launch facilities and 20 launch control facilities. These facilities are scattered over approximately 12,600 square miles in Wyoming, Colorado, and Nebraska. Lands onbase are Department of Defense fee-owned with offbase land use predominantly agricultural. Laramie

County's General Plan supports continued agricultural use in its unincorporated areas. The City of Cheyenne's plan gives emphasis to infill development. Regional recreation areas include 4 national and 15 state parks and forests, including the Rocky Mountain National Park. The rolling to moderately steep terrain is covered with native, short grassland, used mostly for grazing.

TYPICAL ISSUES:

- Possible use of agricultural lands for Hard Silo basing or in the vicinity of launch control facilities in several southeastern Wyoming, southwestern Nebraska, and northwestern Colorado counties.
- Increased pressure on community planning activities in Laramie County.
- Increased use of regional recreation areas such as the Rocky Mountain National Park.
- Potential changes in the visual environment in the Minuteman deployment area.

CULTURAL AND PALEONTOLOGICAL RESOURCES

AREAS OF INVESTIGATION: Cultural and Paleontological Resources of the Region

DISCUSSION: The cultural resource base includes prehistoric and historic archaeological sites, American Indian burials and sacred areas, and paleontological localities. Previous research in the area consisted of small block surveys or linear inventories. Existing information may not be representative of the types and quantity of cultural resources in the area. Cultural resource concerns include potential impacts to unrecorded prehistoric and historic sites, sacred areas important to American Indians, and paleontological localities.

TYPICAL ISSUES:

- Potential disturbance to National Register of Historic Places eligible sites in southeastern Wyoming.
- Potential conflicts with locations important to American Indians for religious or economic uses.
- Potential damage to paleontological sites.

BIOLOGICAL RESOURCES AND THREATENED AND ENDANGERED SPECIES

AREAS OF INVESTIGATION: Regional Vegetation, Wildlife, Aquatic Habitats, Unique and Sensitive Habitats, and Threatened and Endangered Species

DISCUSSION: The vegetation and wildlife at F.E. Warren Air Force Base are characteristic of those found in short-grass prairie communities, which are dominated by blue grama and buffalograss. Wildlife associated with the prairie habitat include pronghorn antelope, prairie dog, and prairie falcon.

Riparian wetlands onbase are restricted to narrow zones along streams that support largely nongame fish. Many unique habitats, including areas used by candidate endangered species, are located nearby. Several federal candidate species are found in the area, but no listed species are present. This area is expected to experience modest development and population growth in the coming years, regardless of whether the proposed project is implemented. Some continued impacts to and degradation of biological resources can be expected in the region regardless of the proposed project.

TYPICAL ISSUES:

- o Potential disturbance of vegetation and wildlife habitat of short-grass prairie, woodland, and riparian habitats.
- o Proximity of the proposed project to prairie and mountain riverine habitats and associated species.
- o Possible effects on the black-footed ferret, Colorado butterfly plant, and other federal and state-listed threatened or endangered species.

AIR QUALITY AND NOISE

AREAS OF INVESTIGATION: Air Quality and Visibility Conditions and Noise Levels

DISCUSSION: The climate in the vicinity of F.E. Warren Air Force Base and the study area is influenced by air masses moving in from the west. The area is distinctively semiarid since the mountain ranges to the west act as an effective moisture barrier. The area currently experiences excellent air quality, partly due to conditions favorable for atmospheric dispersion, neutral stability, extensive mixing height, high wind speeds, and relatively few sources of air pollutants in the immediate area. Visibility is good, averaging approximately 64 miles. Except for Cheyenne Airport and its vicinity, the area has a background noise level of less than 50 decibels, which is typical of rural agricultural areas. Little change in air quality or noise is expected within the region in the future.

TYPICAL ISSUES:

- o Short-term degradation of air quality during construction.
- o Possible short-term increases in noise levels during construction.

WATER RESOURCES

AREAS OF INVESTIGATION: Availability of Surface Water and Groundwater and Water Quality Conditions

DISCUSSION: The quantity of surface waters generated within the proposed project area is relatively small, but the area is bounded by two medium-sized rivers, the North and South Platte. Good-quality groundwater is relatively abundant throughout most of the area, which lies within the much larger High Plains Aquifer. Groundwater depletion has occurred in limited areas and the

state of Wyoming has established several groundwater control areas. Total water use is about 1 million acre-feet per year, with agricultural irrigation accounting for the great majority. Both ground and surface sources are extensively used. The city of Cheyenne, which supplies water to F.E. Warren Air Force Base, used 15,000 acre-feet in 1984. The water supplies available to Cheyenne are adequate to meet projected needs with some additional development.

TYPICAL ISSUES:

- o Potential alteration in surface drainage patterns (Hard Silo).
- o Possible surface water degradation resulting from construction activities in the deployment area.
- o Groundwater withdrawal from areas of declining groundwater table, particularly in the groundwater control areas.
- o The proposed project may require the accelerated development of new water supplies for Cheyenne.
- o Compliance of the proposed project with state water law.

GEOLOGY AND SOILS

AREAS OF INVESTIGATION: Engineering Geologic Conditions Including Potential Geologic Hazards and Conditions of Geologic Materials, Regional Energy and Mineral Resources, and Soil Resources

DISCUSSION: The F.E. Warren Air Force Base deployment area is located predominantly within the Denver-Julesberg Basin, an area of thick sandstones and shales overlain by younger alluvium and terrace deposits. The western edge is characterized by the north-south trending Laramie Range, which joins the Front Range in Colorado to the south. These ranges consist of old igneous and metamorphic rocks. The deployment area lies in an area of low seismicity with an estimated maximum credible earthquake magnitude of 5.5. The Wheatland-Whalen Fault zone intersects part of the proposed project area. Subsidence, liquefaction, and mass movements have not been identified or are of local extent. Oil and gas occur in the Denver-Julesberg Basin with the greatest production in southwestern Nebraska. No mineral resources are identified, with the exception of aggregate, which is fairly abundant. Prime farmland occurs in areas only with adequate irrigation. Many of the soils have a high susceptibility to wind erosion. Sheet erosion is typically found in areas on terraces or floodplains.

TYPICAL ISSUES:

- o Seismic effects of the Wheatland-Whalen Fault zone.
- o Oil and gas resources in western Nebraska.
- o Conflicts with important farmlands.

REGIONAL ENVIRONMENTAL ISSUE AREAS

NORTHEASTERN NORTH DAKOTA

Northeastern North Dakota is being considered as a possible basing area for the Small Intercontinental Ballistic Missile (ICBM) in the Hard Mobile Launcher at Minuteman Facilities basing mode at Grand Forks Air Force Base. The discussions that follow provide an overview of the regional environmental issue areas that are under consideration for northeastern North Dakota.

SOCIOECONOMICS

AREAS OF INVESTIGATION: Regional Growth, and Associated Demands on Housing, Public Services, and Public Finance

DISCUSSION: Grand Forks Air Force Base, its associated Minuteman launch facilities, and immediately adjacent communities occupy a 13-county region of eastern North Dakota and northwestern Minnesota with a 1984 population estimated at 284,800. The population is expected to increase to 337,000 by the year 2000, an annual growth averaging 1.1 percent. The civilian labor force within the region increased to about 138,000 in 1984 and is expected to reach nearly 181,000 in the year 2000. The region's per capita income, adjusted for inflation, was $12,950 in 1984. It is projected to grow at an annual rate of 0.3 percent and reach $13,668 in the year 2000. The housing stock in Grand Forks County, where Grand Forks Air Force Base is located, was estimated at 25,080 units in 1984. The vacancy rate was 7.2 percent with about 1,800 vacant units in 1984. Local public-sector employment in Grand Forks County was 238 persons per 10,000 population, 20 percent below the state average in 1982. Education employment in 1982 was 143 per 10,000 population, compared to the state average of 139. School enrollments fell to 10,700 in 1985, suggesting some current available capacity. Police employment in 1982 was 15 per 10,000 population, compared to the state average of 17. Per capita public expenditures and revenues for local governments in Grand Forks County were $1,023 and $1,066 in 1984, respectively.

TYPICAL ISSUES:

- Project-related housing demand may create a tight housing market. Grand Forks County is presently near a housing vacancy rate of about 3 to 4 percent.
- Grand Forks County public-sector employment will increase to maintain 1984 service levels; funding for this may be inadequate.
- Public school enrollments may increase substantially above 1985 baseline levels creating shortages of facilities and teachers.

UTILITIES

AREAS OF INVESTIGATION: Demands on Utility Systems

DISCUSSION: Potable water systems in Grand Forks County are currently able to meet the needs of the existing population and should be able to meet future demands from existing or programmed facilities. New health regulations in

Minnesota may require the expansion of certain facilities in Polk County and in the city of East Grand Forks. Wastewater facilities throughout the region are handling wastewater flows adequately and should be able to meet the needs of future populations with existing or planned facilities. The newly expanded landfill operated by the City of Grand Forks will be able to dispose of wastes through the year 2010. Suppliers of electrical power and natural gas are able to meet current demands and anticipate consumption levels to be stable through the year 2000.

TYPICAL ISSUES:

- o Water treatment systems in Minnesota require expansion to meet new health requirements.
- o Adequacy of wastewater treatment facilities.

TRANSPORTATION

AREAS OF INVESTIGATION: Level of Service or Congestion on Regional Transportation Networks

DISCUSSION: The primary road network in the study area includes seven major east-west roads (Interstate 94, U.S. 2, and North Dakota State Highways 5, 15, 17, 46, and 200) and eight major north-south roads (Interstate 29; U.S. 75 and 281; North Dakota State Highways 1, 18, 20, and 32; and Minnesota State Highway 220). Rail service is available throughout the area from two Class I railroads, the Soo Line and Burlington Northern. A spur track of the Burlington Northern from Grand Forks enters the southeast section of the base and services the cantonment area. Major scheduled airline service is available at Grand Forks International and Fargo's Hector Airport. Commuter service is available at Devils Lake and Jamestown municipal airports. The major communities in the region include Fargo (1980 population of 61,383), Grand Forks (43,765), and Jamestown (16,280), all in North Dakota.

TYPICAL ISSUES:

- o Increased congestion and decreased level of service due to workers commuting on primary roads such as sections of U.S. 2 (through Grand Forks Air Force Base), North Dakota State Highway 1, and Interstates 29 and 94.

LAND USE

AREAS OF INVESTIGATION: Existing Land Use Plans and Policies, Regional Recreation, and Visual Resources

DISCUSSION: Grand Forks Air Force Base, consisting of 4,830 acres, is located in Grand Forks County, North Dakota. It is responsible for the operation and maintenance of 150 Minuteman III launch facilities and 15 launch control facilities. These facilities are scattered over approximately 7,500 square miles in northeastern North Dakota. Lands onbase are Department of Defense fee-owned with offbase land use predominantly agricultural. Although Grand Forks County does not have a general plan, the City of Grand Forks adopted a plan in 1980. Most residential and commercial development would be directed

toward the southwest part of the city. Regional recreation in the area includes 6 federal and 15 state parks (in North Dakota and Minnesota), including portions of the Chippewa National Forest. The potential deployment area landscape has rolling terrain with short grassland and vast areas of cropland.

TYPICAL ISSUES:

- o Possible use of agricultural lands in the vicinity of launch control facilities in several northeastern North Dakota counties.
- o Increased pressure on community planning activities in Grand Forks County.
- o Increased use of regional recreation areas such as the Chippewa National Forest.
- o Potential changes in the visual environment in several northeastern North Dakota counties.

CULTURAL AND PALEONTOLOGICAL RESOURCES

AREAS OF INVESTIGATION: Cultural and Paleontological Resources of the Region

DISCUSSION: The cultural resource base includes prehistoric and historic archaeological sites and historic structures. American Indian resources and paleontological materials may also occur. Previous research included small block surveys adjacent to perennial streams, and inventories of large areas near major water projects. Existing information may not be representative of the types and quantity of cultural resources in the area. Cultural resource concerns include potential damage to unrecorded archaeological sites, historic structures and paleontological localities, and potential impacts to sacred areas important to American Indians.

TYPICAL ISSUES:

- o Potential disturbance to National Register of Historic Places eligible sites in northeastern North Dakota.
- o Potential conflicts with locations important to American Indians for religious or economic uses.
- o Potential damage to paleontological sites.

BIOLOGICAL RESOURCES AND THREATENED AND ENDANGERED SPECIES

AREAS OF INVESTIGATION: Regional Vegetation, Wildlife, Aquatic Habitats, Unique and Sensitive Habitats, and Threatened and Endangered Species

DISCUSSION: The predominant native vegetation of the Grand Forks Air Force Base area is tall-grass prairie (also known as bluestem prairie). However, much of the native vegetation has been converted to agriculture and rangeland, with a corresponding reduction in wildlife habitat. Notable wildlife species of the area are various waterfowl; whitetail deer; pheasant, grouse, and other

upland game; and mink, muskrat, and other furbearers. The Grand Forks Air Force Base region contains numerous aquatic habitats and wetlands (prairie potholes, streams, rivers, and lakes) which provide important habitat for migratory waterfowl and support excellent fisheries. No endangered species are known to occur on Grand Forks Air Force Base, but three endangered species (bald eagle, peregrine falcon, and whooping crane) are migratory in the area.

TYPICAL ISSUES:

- o Potential disturbance of northern prairie grassland, deciduous forest (in drainages), and associated wildlife habitat.
- o Proximity of the proposed project to numerous prairie pothole wetlands and riverine habitats which provide important waterfowl habitat.
- o Proximity of the proposed project to numerous federal and state wildlife refuges.
- o Possible effects on the peregrine falcon, bald eagle, whooping crane, and other threatened or endangered species of the area.

AIR QUALITY AND NOISE

AREAS OF INVESTIGATION: Air Quality and Visibility Conditions and Noise Levels

DISCUSSION: This area has a continental climate with warm, moist summers and cold winters with light snowfall. Regional visibility is good to excellent. Air quality, even in urban areas, is good, and air quality standards are met throughout the state. Future projections show no expectation of major regional air quality changes. Noise sources and community sensitivity within the region are not current problems and are not expected to be in the future.

TYPICAL ISSUES:

- o Short-term degradation of air quality during construction.
- o Possible short-term increases in noise levels because of construction activities.

WATER RESOURCES

AREAS OF INVESTIGATION: Availability of Surface Water and Groundwater and Water Quality Conditions

DISCUSSION: The Grand Forks Air Force Base study area is a water-short area in which smaller tributaries experience highly erratic discharges. Periods of no flow are almost yearly events making these streams unreliable sources for water supply. Most of the streams in the area are considered satisfactory for domestic use during periods of medium and high flows. Groundwater is highly mineralized and is unsatisfactory for most uses. Total water use is about 70,000 acre-feet per year. Grand Forks Air Force Base and its support communities are supplied from the Red River with a combined total of 11,000 acre-feet per year. This supply is adequate to meet future needs.

TYPICAL ISSUES:

- Possible surface water quality degradation resulting from construction activities in the deployment area.
- Substantial increase in water use at Grand Forks Air Force Base.

GEOLOGY AND SOILS

AREAS OF INVESTIGATION: Engineering Geologic Conditions Including Potential Geologic Hazards and Conditions of Geologic Materials, Regional Energy and Mineral Resources, and Soil Resources

DISCUSSION: The deployment area is located in northeastern North Dakota with the glaciated, rolling landscape of the Drift Prairie occurring in the west and the flat plain of the Red River Valley in the east. The Drift Prairie-Red River Valley boundary is defined by the steep Pembina Escarpment. Glacial sediments are the predominant near-surface geologic units in the area. Seismic activity is low. Frequent flooding occurs along the Red River Valley and in the vicinity of Devils Lake. Landslides in the area are associated with glacial deposits. Low-temperature geothermal waters have been identified. Important sand and gravel deposits and some clay deposits exist within the deployment area. Prime farmlands and farmlands of statewide importance are abundant and occur throughout the region.

TYPICAL ISSUES:

- Public health and safety considerations related to flooding of major streams.
- Availability of concrete-quality aggregate in the state.
- Effects on important farmlands.

REGIONAL ENVIRONMENTAL ISSUE AREAS

NORTH-CENTRAL MONTANA

North-central Montana is being considered as a possible basing area for the Small Intercontinental Ballistic Missile (ICBM) in the Hard Mobile Launcher at Minuteman Facilities basing mode at Malmstrom Air Force Base. The discussions that follow provide an overview of the regional environmental issue areas that are under consideration for north-central Montana.

SOCIOECONOMICS

AREAS OF INVESTIGATION: Regional Growth, and Associated Demands on Housing, Public Services, and Public Finance

DISCUSSION: Malmstrom Air Force Base, its associated Minuteman launch facilities, and immediately adjacent communities are dispersed over a nine-county area of north-central Montana with a 1984 population of 171,000. The population is expected to increase by 0.8 percent annually, reaching 193,900 in the year 2000. The civilian labor force within the region increased to about 82,000 in 1984 and is expected to reach almost 102,000 in the year 2000. The region's per capita income, adjusted for inflation, was $11,700 in 1984. It is projected to grow at an annual rate of 0.2 percent and reach $12,030 in the year 2000. The housing stock in Cascade County, where Malmstorm Air Force Base is located, was estimated at 32,000 units in 1984. The vacancy rate was 5.7 percent with about 1,850 vacant units in 1984. Local public-sector employment in Cascade County was 291 persons per 10,000 population, 17.6 percent less than the state average in 1982. Education employment in 1982 was 124 per 10,000 population, compared to the state average of 163. School enrollments in 1985 continued to decrease to 13,900 students, suggesting considerable current available capacity. Police employment in 1982 was 17 per 10,000 population, compared to the state average of 20. Per capita public expenditures and revenues of local governments in Cascade County were $914 and $1,227 in 1984, respectively.

TYPICAL ISSUES:

- Proposed project construction activities may cause a rapid rise and decline of population and employment in an otherwise static economic area.
- Short-term housing requirements, while reducing currently high recovery rates, may also stimulate new development that will not be needed by either the long-term baseline population or military operations personnel.
- Short-term increased demand for public services including education and police will require increases in staffing and facilities not later supported by either baseline or operation-induced population.
- Capital improvement requirements during the construction phase of the proposed project are likely to exceed the additional revenue generated in both the short and long term.

UTILITIES

AREAS OF INVESTIGATION: Demands on Utility Systems

DISCUSSION: Potable water treatment and wastewater treatment systems in Cascade County currently have excess capacities that will be available through the year 2000. Solid waste disposal facilities will continue to have adequate disposal space if expansion plans at the Great Falls site are implemented. Electrical power and natural gas supplies are currently available in excess of existing demands and will continue to meet the needs of the projected population.

TYPICAL ISSUES:

- o Adequacy of water and wastewater infrastructure to accommodate future growth.
- o Solid waste disposal capacity in Cascade County.

TRANSPORTATION

AREAS OF INVESTIGATION: Level of Service or Congestion on Regional Transportation Networks

DISCUSSION: The primary road network in the study area includes four east-west roads (U.S. 2 and 12 and Montana State Highways 81 and 200) and eight north-south routes (Interstate 15; U.S. 87, 89, 191, and 287; and Montana State Highways 3, 19, and 80). Rail service in the region is provided principally by the Burlington Northern and the newly organized Central Montana Railroad. Major scheduled airline service is available at Great Falls International Airport, Billings Logan Field Airport, and Helena Municipal Airport. Intrastate commuter service is available at Lewistown Municipal Airport. The major population centers in the region include Billings (1980 population of 66,798), Great Falls (56,725), and Helena (23,938), all in Montana.

TYPICAL ISSUES:

- o Increased congestion and decreased level of service due to workers commuting on primary roads such as Interstate 15 and U.S. 87.

LAND USE

AREAS OF INVESTIGATION: Existing Land Use Plans and Policies, Regional Recreation, and Visual Resources

DISCUSSION: Malmstrom Air Force Base, consisting of approximately 3,670 acres, is located in eastern Cascade County, Montana. It is responsible for the operation and maintenance of 150 Minuteman II launch facilities, 50 Minuteman III launch facilities, and 20 launch control facilities. These facilities are scattered over approximately 23,000 square miles in west-central Montana. The majority of the land onbase is Department of Defense fee-owned. Offbase land use is predominantly agricultural. General plans for both the City of Great Falls and Cascade County describe goals and policies related to community development. Regional recreation in the area includes

4 national forests and over 30 state parks and recreation areas, including the Lewis and Clark and Deerlodge national forests. The landscape of the area reveals mostly rolling terrain with steeper slopes toward the southwest. Vegetation includes short grassland and dispersed stands of deciduous and evergreen trees.

TYPICAL ISSUES:

- o Possible use of agricultural lands in the vicinity of launch control facilities in several north-central Montana counties.
- o Increased pressure on community planning activities in Cascade County.
- o Increased use of regional recreation areas such as the Lewis and Clark National Forest.
- o Potential changes in the visual environment in several north-central Montana counties.

CULTURAL AND PALEONTOLOGICAL RESOURCES

AREAS OF INVESTIGATION: Cultural and Paleontological Resources of the Region

DISCUSSION: The cultural resource base includes prehistoric and historic archaeological sites, American Indian sacred areas, and paleontological localities. Numerous small block inventories have been conducted throughout the region, and at least three large-scale inventories have been prepared. Existing information is probably representative of the types and quantity of cultural resources in the area. Cultural resource concerns include potential impacts to prehistoric and historic archaeological sites, American Indian sacred areas, and paleontological sites.

TYPICAL ISSUES:

- o Potential disturbance to National Register of Historic Places eligible sites in north-central Montana.
- o Potential conflicts with locations important to American Indians for religious or economic uses.
- o Potential damage to paleontological sites.

BIOLOGICAL RESOURCES AND THREATENED AND ENDANGERED SPECIES

AREAS OF INVESTIGATION: Regional Vegetation, Wildlife, Aquatic Habitats, Unique and Sensitive Habitats, and Threatened and Endangered Species

DISCUSSION: Much of the native vegetation of the Malmstrom Air Force Base region has been converted to agriculture; areas still supporting native vegetation are predominantly mixed grass and short-grass prairie. Higher elevations of the Rocky Mountains support coniferous forests. Notable wildlife of the area include mule deer, elk, pronghorn antelope, and other big game; black bear, coyote, mountain lion, and other furbearers; and various upland game and

waterfowl. Potholes and riparian wetlands occur near some of the launch facilities, and the Missouri and Yellowstone rivers and tributaries support wetland habitats and substantial fisheries. A number of unique biological areas occur near Malmstrom Air Force Base and associated launch facilities, including Giant Springs, three national wildlife refuges, and several wilderness areas. Two federal endangered species, the bald eagle and peregrine falcon, are common migrants in the base vicinity. This area is expected to experience little development and growth in the coming years if the proposed project is not implemented. This is likely to result in minimal new impact to biological resources of the area.

TYPICAL ISSUES:

- o Potential disturbance of mixed and short-grass prairie, agricultural land, and associated wildlife habitat.
- o Potential increased hunting pressure on game species.
- o Proximity to prairie potholes and streams and to mountain riverine habitats.
- o Proximity to prairie wildlife refuges and unique habitats of mountainous areas.
- o Potential effects on the bald eagle, peregrine falcon, grizzly bear, and other threatened and endangered species of the area.

AIR QUALITY AND NOISE

AREAS OF INVESTIGATION: Air Quality and Visibility Conditions and Noise Levels

DISCUSSION: Malmstrom Air Force Base, located in North Dakota, is characterized by a continental climate with cold winters, hot summers, and relatively strong winds. Good visibility prevails throughout the region and air quality is good, although some urban areas have problems meeting present standards for both total suspended particulates and carbon monoxide. Future projections show little expected change in air quality. Noise sources and community sensitivity within the region currently are not problems and are not expected to be in the future.

TYPICAL ISSUES:

- o Possible effects of population influx on ability to meet air quality standards in urban areas.
- o Short-term degradation of air quality during construction.
- o Possible short-term increases in noise levels due to construction activities.

WATER RESOURCES

AREAS OF INVESTIGATION: Availability of Surface Water and Groundwater and Water Quality Conditions

DISCUSSION: Although runoff in the area is sparse, Malmstrom Air Force Base has abundant supplies of good-quality water available from the Missouri River. Groundwater is also abundant, although much of it lies at considerable depth and is highly mineralized. The 1975 water use was 1.5 million acre-feet per year. The main consumptive use is irrigation, which is projected to slowly decrease. The water supply for Malmstrom Air Force Base is supplied by Great Falls with a combined consumption of 15,000 acre-feet per year. This supply is adequate to meet anticipated growth.

TYPICAL ISSUES:

- Possible surface water quality degradation in the deployment area, particularly the Sun River drainage.

GEOLOGY AND SOILS

AREAS OF INVESTIGATION: Engineering Geologic Conditions Including Potential Geologic Hazards and Conditions of Geologic Materials, Regional Energy and Mineral Resources, and Soil Resources

DISCUSSION: Gently sloping plateaus and hills of the deployment area are surrounded to the west and southwest by the more rugged foothills of the northern Rocky Mountains. The maximum credible earthquake for the region is estimated to have a magnitude of 6.5. Planar and rotational landslides have occurred within the deployment area. Commodities or raw materials on the Strategic and Critical Materials list, and active mining districts for metallic minerals including lead and zinc, have been documented. No oil fields have been identified, although some oil exploration is active in Lewis and Clark County. Coal has been mined and potential reserves exist in the deployment area. Sand, gravel, crushed rock, stone, and other suitable aggregate for concrete and construction purposes are available. Prime farmland or farmland of statewide importance dominates the region, with the western and southwestern portions used as rangeland. Soils are moderately susceptible to erosion in some floodplains and terraces.

TYPICAL ISSUES:

- Mass movements along the Missouri River Valley.
- Oil and gas resources in the Sweetgrass Hills area.
- Susceptibility of soils to wind and sheet erosion.

REGIONAL ENVIRONMENTAL ISSUE AREAS

NORTHWESTERN NORTH DAKOTA

Northwestern North Dakota is being considered as a possible basing area for the Small Intercontinental Ballistic Missile (ICBM) in the Hard Mobile Launcher at Minuteman Facilities basing mode at Minot Air Force Base. The discussions that follow provide an overview of the regional environmental issue areas that are under consideration for northwestern North Dakota.

SOCIOECONOMICS

AREAS OF INVESTIGATION: Regional Growth, and Associated Demands on Housing, Public Services, and Public Finance

DISCUSSION: Minot Air Force Base, its associated Minuteman launch facilities, and immediately adjacent communities are spread over an eight-county region of north-central North Dakota with a 1984 population of 111,300. The population is expected to increase to 127,300 in the year 2000, an average annual growth rate of 0.8 percent. The civilian labor force within the region increased to about 44,000 in 1984 and is expected to reach nearly 56,000 in the year 2000. The region's per capita income, adjusted for inflation, was $12,800 in 1984. It is projected to increase gradually to $13,000 by the year 2000. The housing stock in Ward County, where Minot Air Force Base is located, was estimated at 22,010 units in 1984. The vacancy rate was 4.1 percent, with about 900 vacant units in 1984. Local public-sector employment in Ward County was 265 persons per 10,000 population, or 10.8 percent below the state average. Education employment in 1982 was 127 per 10,000 population, compared to the state average of 139. School enrollment increased slowly from 1980 to 1985 reaching 10,650 students, suggesting no current available capacity. Police employment in 1982 was 16 per 10,000 population, which was equal to the state average. Per capita public expenditures and revenues of local governments in Ward County were $959 and $1,014 in 1984, respectively.

TYPICAL ISSUES:

- Rapid rise and decline of construction-related population in a generally static economic area.
- Increased demand for housing units only during the 8-year construction phase, resulting in high post-construction vacancy rates.
- Increased construction phase demands for public services including education and police that will require responses (both staff and facilities) that generally will not be needed during the operations phase.
- Short-term requirement for capital improvement funds not immediately offset by project-induced revenues.

UTILITIES

AREAS OF INVESTIGATION: Demands on Utility Systems

DISCUSSION: Existing and future demands for potable water should be available from existing facilities operated by the City of Minot. Wastewater lagoons currently are providing adequate capacity to the city and Minot Air Force Base. With the planned expansions at the base, capacity should be in place through the year 2000. Current suppliers of electric power and natural gas anticipate adequate supplies to meet their forecasts.

TYPICAL ISSUES:

- o Sufficient water treatment and distribution facilities to meet future growth requirements.
- o Capacity of wastewater treatment facilities in Ward County.

TRANSPORTATION

AREAS OF INVESTIGATION: Level of Service or Congestion on Regional Transportation Networks

DISCUSSION: The primary road network in the study area includes five major east-west highways (U.S. 2 and North Dakota State Highways 5, 23, 50, and 200) and nine major north-south roads (U.S. 52, 83, and 85 and North Dakota State Highways 3, 8, 14, 22, 40, and 41). Rail service is available throughout the area from two Class I railroads, the Soo Line and Burlington Northern. A spur track of the Burlington Northern from the city of Minot services the cantonment area of the base. Major scheduled airline service is available from Bismarck Municipal and Minot International airports. Commuter service is available from Williston Airport. The major population centers in the region include Bismarck (1980 population of 44,485), Minot (32,843), and Williston (13,336), North Dakota.

TYPICAL ISSUES:

- o Increased congestion and decreased level of service due to workers commuting on primary roads such as U.S. 52 and 83.

LAND USE

AREAS OF INVESTIGATION: Existing Land Use Plans and Policies, Regional Recreation, and Visual Resources

DISCUSSION: Minot Air Force Base, consisting of 5,381 acres, is located in Ward County, North Dakota. It is responsible for the operation and maintenance of 150 Minuteman III launch facilities and 15 launch control facilities. These facilities are scattered over 8,000 square miles in northern North Dakota. Lands onbase are primarily Department of Defense fee-owned with offbase land use predominantly agricultural. Ward County does not have a general plan, but zoning protects Minot Air Force Base from urban encroachment. The City of Minot's General Plan was adopted in 1969, and calls for new residential and commercial development to take place in the city's northwest

quadrant. The regional recreation areas include four federal and seven state park and recreation areas, including the Theodore Roosevelt National Park. The landscape of the Minuteman deployment area is characterized by short grassland and rolling topography interspersed with lakes and streams.

TYPICAL ISSUES:

- o Possible use of agricultural lands in the vicinity of launch control facilities in several northwestern South Dakota counties.
- o Increased pressure on community planning activities in Ward County.
- o Increased use of regional recreation areas such as the Theodore Roosevelt National Park.
- o Potential changes in the visual environment in several northwestern North Dakota counties.

CULTURAL AND PALEONTOLOGICAL RESOURCES

AREAS OF INVESTIGATION: Cultural and Paleontological Resources of the Region

DISCUSSION: The cultural resource base includes prehistoric and historic archaeological sites, American Indian burials and sacred areas, and paleontological localities. Previous research in the area includes several inventories of large areas for flood control or water projects and energy development, and many small parcel surveys for oil and gas development. Existing information may not be representative of the types and quantities of cultural resources in all environmental zones in the area. Cultural resource concerns include potential damage to unrecorded archaeological sites, impacts to sacred areas important to American Indians, and impacts to paleontological localities.

TYPICAL ISSUES:

- o Potential disturbance to National Register of Historic Places eligible sites in northwestern North Dakota.
- o Potential conflicts with locations important to American Indians for religious or economic uses.
- o Potential damage to paleontological sites.

BIOLOGICAL RESOURCES AND THREATENED AND ENDANGERED SPECIES

AREAS OF INVESTIGATION: Regional Vegetation, Wildlife, Aquatic Habitats, Unique and Sensitive Habitats, and Threatened and Endangered Species

DISCUSSION: Minot Air Force Base lies in the northern Great Plains, and the predominant native vegetation type is mixed-grass prairie. Woodlands occur along rivers and streams. Approximately two-thirds of the native vegetation has been converted to agriculture, with a corresponding loss of wildlife habitat. Notable wildlife species of the area are whitetail deer; pheasant, grouse, and other upland game; and numerous waterfowl and furbearers. North Dakota is one of the more important wetland areas of the United States; many

potholes, streams, and reservoirs support considerable migratory waterfowl populations and fisheries. No endangered or threatened species occur on Minot Air Force Base, but three endangered species (bald eagle, peregrine falcon, and whooping crane) are migratory in the vicinity.

TYPICAL ISSUES:

- o Potential disturbance of mixed-grass prairie, agricultural land, and associated wildlife habitat.
- o Proximity of the proposed project to prairie potholes, marshes, and streams, which provide habitat for waterfowl, and other wildlife refuges.
- o Proximity of the proposed project to numerous federal and state wildlife refuges.
- o Possible effects on the peregrine falcon, bald eagle, whooping crane, and other threatened or endangered species of the area.

AIR QUALITY AND NOISE

AREAS OF INVESTIGATION: Air Quality and Visibility Conditions and Noise Levels

DISCUSSION: Minot Air Force Base is located in an area with cold winters, warm summers, and a moderate amount of precipitation. Air quality and visibility are good, with surface winds averaging 12 miles per hour over the year. No air pollution problems exist and violations of total suspended particulates and carbon monoxide standards do not occur. Future projections show no expectation of major regional air quality changes. Noise sources and community noise sensitivity within the region currently are not problems and are not expected to be in the future.

TYPICAL ISSUES:

- o Short-term degradation of air quality during construction.
- o Possible short-term increases in noise levels due to construction activities.

WATER RESOURCES

AREAS OF INVESTIGATION: Availability of Surface Water and Groundwater and Water Quality Conditions

DISCUSSION: Runoff in this area is sparse and half of the water available for use is supplied by groundwater aquifers. Water resources are sufficient, although much of the groundwater is highly mineralized and unsuitable for most uses across the majority of the study area. The 1980 water use in the area was 42,000 acre-feet. The main consumptive use is irrigation. The current water supply for the city of Minot, North Dakota, which supplies Minot Air Force Base, is 7,000 acre-feet per year. This supply is adequate to meet anticipated growth. However, periodic water shortages are experienced at Minot Air Force Base.

TYPICAL ISSUES:

- Groundwater decline of the Sundre Aquifer, which supplies 70 percent of the water for the city of Minot, may be accelerated.
- Surface water quality degradation due to proposed project construction.
- Proposed project water requirements may intensify periodic water shortages currently experienced at Minot Air Force Base.

GEOLOGY AND SOILS

AREAS OF INVESTIGATION: Engineering Geologic Conditions Including Potential Geologic Hazards and Conditions of Geologic Materials, Regional Energy and Mineral Resources, and Soil Resources

DISCUSSION: Gently rolling glacial plains, consisting of glacial and fluvial deposits, cover most of the proposed project area. The deployment area falls within the Williston Structural Basin. Minot Air Force Base lies in seismic zone 1, with only a few epicenters identified in the deployment area. Periodic flooding of major rivers occurs in the region. Geologic resources in the proposed project area include oil and gas, low-temperature geothermal, coal, uranium, nonmetallic mineral resources, and sand and gravel. Large tracts of land in the proposed project area are considered prime farmland or farmland of statewide importance. Soils are moderately susceptible to wind and sheet erosion.

TYPICAL ISSUES:

- Public health and safety considerations associated with flooding of major streams.
- Availability of concrete-quality aggregate in the region.
- Effects on important farmlands.

REGIONAL ENVIRONMENTAL ISSUE AREAS

WEST-CENTRAL MISSOURI

West-central Missouri is being considered as a possible basing area for the Small Intercontinental Ballistic Missile (ICBM) in the Hard Mobile Launcher at Minuteman Facilities basing mode at Whiteman Air Force Base. The discussions that follow provide an overview of the regional environmental issue areas that are under consideration for west-central Missouri.

SOCIOECONOMICS

AREAS OF INVESTIGATION: Regional Growth, and Associated Demands on Housing, Public Services, and Public Finance

DISCUSSION: Whiteman Air Force Base, its associated Minuteman launch facilities, and immediately adjacent communities are located in an 18-county region in western Missouri with a 1984 population of 991,100. The population is expected to decline slightly to 971,700 by the year 2000, an average annual rate of -0.1 percent. The civilian labor force within the region increased to nearly 492,000 in 1984 and is expected to reach about 524,000 in the year 2000. The region's per capita income, adjusted for inflation, was $12,200 in 1984. It is projected to grow at an annual rate of 0.5 percent and reach $13,273 in the year 2000. The housing stock in Johnson County, where Whiteman Air Force Base is located, was estimated at 13,000 units in 1984. The vacancy rate was 11.4 percent, with about 1,600 vacant units in 1984. Local public-sector employment in Johnson County was 287 persons per 10,000 population, which was 8.0 percent above the state average in 1982. Education employment in 1982 was 118 per 10,000 population, compared to the state average of 116. School enrollments remained relatively constant at about 6,200 students between 1980 and 1985, suggesting minimal current available capacity. Police employment in 1982 was 13 per 10,000 population, compared to the state average of 24. Per capita public expenditures and revenues of local governments in Johnson County were $791 and $985 in 1984, respectively.

TYPICAL ISSUES:

- Currently high housing vacancy rates could be reduced by people relocating due to the proposed project. This may create a tight housing market.
- Project-related inmigration could increase enrollments in Johnson County during the peak construction period.
- To maintain present service levels, additional public-sector employees would likely be needed to support project-induced demands.

UTILITIES

AREAS OF INVESTIGATION: Demands on Utility Systems

DISCUSSION: Potable water and wastewater treatment in Johnson and Pettis counties is adequately provided by a number of small municipal and rural systems. With a declining population, most existing facilities should be able

to meet future demands. Solid waste disposal capacity in the region will become scarce if additional sites are not established by 1990. Electric power and natural gas supplies are meeting the present needs of the region. Both utilities expect to have excess capacity available through the year 2000.

TYPICAL ISSUES:

- o Adequacy of existing water treatment and distribution systems in Johnson and Pettis counties.
- o Space for additional landfill capacity throughout the region.

TRANSPORTATION

AREAS OF INVESTIGATION: Level of Service or Congestion on Regional Transportation Networks

DISCUSSION: The primary road network in the study area includes seven major east-west roads (Interstate 70; U.S. 24, 50, 54, and 60; and Missouri State Highways 7 and 52) and eight major north-south roads (Interstate 35; U.S. 63, 65, 69, 71, and 169; and Missouri State Highways 5 and 13). An extensive system of rail service is available throughout the area from ten Class I railroads. A spur from a main line of the Missouri Pacific serves the cantonment area of Whiteman Air Force Base. Major scheduled airline service is available at Kansas City and Springfield, Missouri, and commuter service at Columbia, Jefferson City, and Joplin, Missouri. The largest communities in the region, those with more than 50,000 (1980 census) population, include Kansas City (448,159), Springfield (133,116), Independence (111,806), and Columbia (62,061), Missouri and Kansas City (161,087) and Overland Park (81,784), Kansas.

TYPICAL ISSUES:

- o Increased congestion and decreased level of service due to workers commuting on primary roads such as U.S. 50 and 71, Interstate 70, and Missouri State Highway 13.

LAND USE

AREAS OF INVESTIGATION: Existing Land Use Plans and Policies, Regional Recreation, and Visual Resources

DISCUSSION: Whiteman Air Force Base, consisting of 3,737 acres, is located in Johnson County, Missouri. It is responsible for the operation and maintenance of 150 Minuteman II launch facilities and 15 launch control facilities. These facilities are scattered over approximately 10,000 square miles in west-central Missouri. Lands onbase are primarily Department of Defense fee-owned with offbase land use predominantly agricultural. Johnson County and the City of Knob Noster do not have general plans; however, the nearby cities of Warrensburg and Sedalia have adopted plans. Warrensburg projects future city growth to take place mostly to the north and east. Regional recreation areas include 8 federal and 18 state-operated recreation areas, including a portion of the Mark Twain National Forest and the Harry S Truman State Park. The landscape is rolling hills with some hardwood forests in the riparian valleys.

TYPICAL ISSUES:

- Possible use of agricultural lands in the vicinity of launch control facilities in several west-central Missouri counties.
- Increased pressure on community planning activities in Johnson and Pettis counties.
- Increased use of regional recreation areas such as the Mark Twain National Forest.
- Potential changes in the visual environment in several west-central Missouri counties.

CULTURAL AND PALEONTOLOGICAL RESOURCES

AREAS OF INVESTIGATION: Cultural and Paleontological Resources of the Region

DISCUSSION: The cultural resource base includes prehistoric and historic archaeological sites, historic structures, trails, sites of historic events, and paleontological localities. Previous research includes field surveys, reports from amateur archaeologists, and documentary studies. Existing information is representative of the kinds and numbers of cultural resources in the area. Cultural resource concerns include potential damage to unrecorded prehistoric and historic archaeological sites and paleontological localities.

TYPICAL ISSUES:

- Potential disturbance to National Register of Historic Places eligible sites in west-central Missouri.
- Potential damage to paleontological sites.

BIOLOGICAL RESOURCES AND THREATENED AND ENDANGERED SPECIES

AREAS OF INVESTIGATION: Regional Vegetation, Wildlife, Aquatic Habitats, Unique and Sensitive Habitats, and Threatened and Endangered Species

DISCUSSION: Much of the native forest and grassland of the Whiteman Air Force Base vicinity has been converted to agriculture. Areas still supporting native vegetation are predominantly oak-hickory forest of the Ozark region and bluestem prairie. Notable wildlife species are bobwhite quail, greater prairie chicken, turkey, whitetail deer, and various furbearers and waterfowl. Whiteman Air Force Base and the surrounding area contain ponds and streams that support mainly warmwater fisheries. The Missouri and Osage rivers, along with their associated reservoirs and tributaries, provide wetland habitat and recreational fisheries. Forty-seven Missouri-designated natural areas occur in the base region. No federal endangered or threatened species are known to occur on Whiteman Air Force Base; the base and associated launch facilities lie within the range of seven endangered species. The greater prairie chicken (state rare) occurs onbase. This area is expected to experience little growth or development in the coming years if the proposed project is not implemented. This is likely to result in minimal new impact to biological resources of the region.

TYPICAL ISSUES:

- Potential disturbance of agricultural land, oak-hickory forest, and associated wildlife habitat.
- Proximity of the proposed project to areas of bottomland forest and extensive stream and reservoir systems and habitats.
- Proximity of the proposed project to numerous state-designated natural areas and wildlife refuges.
- Possible effects on the bald eagle, peregrine falcon, gray bat, greater prairie chicken, and other threatened and endangered species of the area.

AIR QUALITY AND NOISE

AREAS OF INVESTIGATION: Air Quality and Visibility Conditions and Noise Levels

DISCUSSION: Air quality on Whiteman Air Force Base and within the deployment area is good. The study area is in attainment status for all criteria pollutants and there are no Prevention of Significant Deterioration Class I areas in or near it. Most of the time, visibility ranges between 17 and 20 miles, with haze, fog, and precipitation being the primary causes for occasional restriction. Background noise levels are low, ranging from 35 to 55 decibels throughout the area, with higher levels near major roads and highways. Future projections show no major air quality changes or changes in the regional noise conditions.

TYPICAL ISSUES:

- Possible short-term increases in noise levels due to construction activities.

WATER RESOURCES

AREAS OF INVESTIGATION: Availability of Surface Water and Groundwater and Water Quality Conditions

DISCUSSION: This region receives adequate rainfall and contains numerous streams and rivers. The Missouri River is the major surface water feature in the northern part of the study area, along with Truman Reservoir and Lake of the Ozarks on the Osage River in the southern part of the area. A deep regional aquifer is the principal water supply. However, poor groundwater quality in the northwest area limits use and is accompanied by an attendant increase in surface water utilization. In 1984, total water use from all sources was approximately 840,000 acre-feet. Major water use in the region is for thermoelectric-power production, followed by municipal and industrial demands. Total water use by Whiteman Air Force Base and its support towns is 6,300 acre-feet. No major increases in future water demand are anticipated.

TYPICAL ISSUES:

- Development of additional water supplies to meet proposed project demands, particularly at Whiteman Air Force Base and its support communities of Sedalia and Warrensburg.

GEOLOGY AND SOILS

AREAS OF INVESTIGATION: Engineering Geologic Conditions Including Potential Geologic Hazards and Conditions of Geologic Materials, Regional Energy and Mineral Resources, and Soil Resources

DISCUSSION: The proposed project area is typified by rolling plains of low relief. Seismicity in the area is minimal with no evidence of active faulting. Ground subsidence has occurred in the proposed project area. Flooding of principal streams and tributaries occurs periodically. Identified geologic resources include coal, oil and gas, lead, zinc, barite, crushed stone, and sand and gravel. Commercial production of oil and gas, coal, and crushed stone occurs in the proposed project area. Most of the region is used for agriculture and is considered prime farmland or farmland of statewide importance. Many of the soils in the proposed project area are susceptible to wind and sheet erosion.

TYPICAL ISSUES:

- Public health and safety considerations associated with flooding of major streams.
- Conflicts with coal and oil resources in the area.
- Effects on important farmlands.

REGIONAL ENVIRONMENTAL ISSUE AREAS

SOUTHEASTERN ARIZONA

Southeastern Arizona is being considered as a possible basing area for the Small Intercontinental Ballistic Missile (ICBM) in the Hard Silo in Patterned Array basing mode at Davis-Monthan Air Force Base. The discussions that follow provide an overview of the regional environmental issue areas that are under consideration for southeastern Arizona.

SOCIOECONOMICS

AREAS OF INVESTIGATION: Regional Growth, and Associated Demands on Housing, Public Services, and Public Finance

DISCUSSION: Suitable deployment areas are dispersed over a five-county region of south-eastern Arizona with a 1984 population of 839,500. The population is expected to increase by 2.6 percent annually, to 1.3 million in the year 2000. The civilian labor force within the region increased to about 336,000 in 1984 and is expected to reach over 533,000 in the year 2000. The region's per capita income, adjusted for inflation, was $10,800 in 1984. It is projected to show only minimal gains and reach $10,900 in the year 2000. The housing stock in Pima County, where Davis-Monthan Air Force Base is located, was estimated at 235,800 units in 1984. The vacancy rate was 6.0 percent with about 14,100 vacant units in 1984. Local public-sector employment in Pima County was 316 persons per 10,000 population, 9.7 percent below the state average in 1982. Education employment in 1982 was 107 per 10,000 population, compared to the state average of 129. School enrollments in 1985 reached a new high of 97,500 students, suggesting no current available capacity. Police employment in 1982 was 21 per 10,000 population, compared to the state average of 24. Per capita public expenditures and revenues of local governments in Pima County were $1,470 and $1,494 in 1984, respectively.

TYPICAL ISSUES:

- Projected available housing stock may be insufficient to avoid housing market dislocations during the proposed project construction phase.
- Recent and projected growth in Pima County indicates limited additional school capacity may be available to support project-induced demands.
- Project-induced increases in public service demand may require hiring additional public-sector personnel in Pima County to maintain current service levels.

UTILITIES

AREAS OF INVESTIGATION: Demands on Utility Systems

DISCUSSION: Potable water treatment facilities for the city of Tucson and the base are adequate to meet 1986 demands. Planned expansions to accommodate additional growth and the receipt of the Central Arizona Project water should

meet future demands. Wastewater from the base is treated at facilities operated by Pima County. These facilities, along with others in the county's system, are barely able to meet the increased demands caused by a population that is growing at an annual rate of 2.6 percent. Planning efforts presently ongoing may accommodate the necessary system expansions programmed for the years 1990 to 2000. Present solid waste facilities are adequate and efforts are underway to site the facilities necessary to handle wasteloads in the year 2000. Tucson Electric Power has sufficient electrical generating capacity to meet projected demands through the year 2000, although they may need to supplement their supply to increase their projected reserve capacity.

TYPICAL ISSUES:

- o Expansion of water treatment facilities to treat water supplies delivered by the Central Arizona Project.
- o Adequacy of wastewater treatment facilities.
- o Siting of additional solid waste disposal facilities.

TRANSPORTATION

AREAS OF INVESTIGATION: Level of Service or Congestion on Regional Transportation Networks

DISCUSSION: The primary road network for the Davis-Monthan Air Force Base deployment area includes five major east-west highways (Interstates 8 and 10, U.S. 60 and 80, and Arizona State Highway 86) and five major north-south highways (Interstate 19, U.S. 89 and 666, and Arizona State Highways 77 and 90). Rail service is available through the center of the study area from east to west, with main line access to Davis-Monthan Air Force Base in Tucson. Major commercial airline service is available at Tucson, with commuter service in the southeast at Sierra Vista and Douglas, Arizona. The largest communities in the area are Tucson (1980 census population of 330,537), Sierra Vista (24,937), Nogales (15,683), Casa Grande (14,971), and Douglas (13,058). Located at the extreme northwest corner of the area are Phoenix, Mesa, and Chandler, with 1980 census populations of 789,704; 152,453; and 29,673; respectively.

TYPICAL ISSUES:

- o Increased congestion and decreased level of service due to workers commuting on primary highways such as Interstates 10 and 19 and U.S. 89.

LAND USE

AREAS OF INVESTIGATION: Existing Land Use Plans and Policies, Regional Recreation, and Visual Resources

DISCUSSION: Davis-Monthan Air Force Base is located near Tucson in Pima County, Arizona, and contains 10,800 acres. Only about 20 percent of the base is withdrawn from the public domain, with the remainder approximately evenly divided between Department of Defense fee-owned and leased land. Offbase land

use in the five-county area consists mostly of rangeland with some irrigated croplands (about 3.3% of the total area). About 21 percent of the land in the five counties is privately owned. Both the City of Tucson and Pima County have adopted plans for future land use which would restrict development to low-density residential uses east of the base. The regional recreation areas around Tucson include four federal and six state parks, including Organ Pipe Cactus and Chiricahua national monuments. The visual landscape of the Davis-Monthan Air Force Base deployment area reveals rugged mountains and high desert valleys with small varieties of cacti and shrubs.

TYPICAL ISSUES:

- o Possible use of rangeland for Hard Silo basing in southwestern Arizona.
- o Increased pressure on community planning activities in Pinal County.
- o Increased use of regional recreation areas such as the Organ Pipe National Monument.
- o Potential change to the visual environment in southeastern Arizona.

CULTURAL AND PALEONTOLOGICAL RESOURCES

AREAS OF INVESTIGATION: Cultural and Paleontological Resources of the Region

DISCUSSION: The cultural resource base includes prehistoric and historic archaeological sites, historic structures, mines, trails, American Indian sacred and traditional areas, and paleontological localities. A cultural resources overview has been written for Davis-Monthan Air Force Base, and many other areas in the vicinity have been investigated. The region has been used traditionally by American Indian groups still living on reservations in the area. Existing information can be used to estimate kinds and densities of cultural resources. Cultural resource concerns include potential impacts on unrecorded historic and prehistoric sites, sacred and traditional use areas important to American Indians, and important paleontological sites.

TYPICAL ISSUES:

- o Potential disturbance to National Register of Historic Places eligible sites in southeastern Arizona.
- o Potential conflicts with locations important to American Indians for religious or economic uses.
- o Potential disturbance of paleontological sites.

BIOLOGICAL RESOURCES AND THREATENED AND ENDANGERED SPECIES

AREAS OF INVESTIGATION: Regional Vegetation, Wildlife, Aquatic Habitats, Unique and Sensitive Habitats, and Threatened and Endangered Species

DISCUSSION: The vegetation and wildlife of this area are characteristic of the Sonoran Desert. Paloverde and creosote bush/bursage communities dominate the

area. Wildlife resources in the area are adapted to the environmental stress of the desert and include the kangaroo rat, mule deer, javelina, quail, and roadrunner. Major aquatic habitats include the San Pedro and Santa Cruz rivers and their associated riparian habitats. Four unique biological areas exist in or adjacent to potential direct impact area. No federally listed species are known to occur in the potential direct impact area, although a number of candidate species are found. Considerable development and growth is expected in southern Arizona in the coming years, regardless of whether the proposed project is implemented. This growth is likely to place additional pressure on biological resources in the area.

TYPICAL ISSUES:

- o Potential disturbance of Sonoran Desert vegetation and wildlife habitat, including desert wash and riparian habitats.
- o Possible effects on aquatic habitats of the San Pedro and Santa Cruz River drainages.
- o Proximity of the proposed project to state-designated natural areas and to mountain habitats of Coronado National Forest.
- o Possible effects on the masked bobwhite, gila topminnow, Yaqui chub, and other federal and state-listed threatened and endangered species of the area.

AIR QUALITY AND NOISE

AREAS OF INVESTIGATION: Air Quality and Visibility Conditions and Noise Levels

DISCUSSION: The Davis-Monthan Air Force Base deployment area is located in the Sonoran Desert at elevations ranging from 2,500 to 2,900 feet. The semi-arid climate is influenced in winter by infrequent tropical storms from the Pacific and in the summer by frequent thunderstorms. Precipitation averages 11 inches annually over the region. Visibility is good, but in Tucson, the number of days a year when visibility is 60 miles or better has been reduced to one-quarter of what it was in the past. Air quality monitoring data within the Tucson nonattainment area show standards are violated frequently for both total suspended particulates and carbon monoxide. In other parts of the region, the sparse data indicate no problems except for occasional total suspended particulates excursions or high sulfur dioxide levels near copper smelters. Continued population growth in Tucson indicates a low potential for air quality improvement in the future. Urban noise levels are not high and are expected to stay within normal limits. In areas away from population concentrations, noise levels are expected to remain low (20-30 decibels).

TYPICAL ISSUES:

- o Possible changes in the already reduced regional visibility.
- o Short-term degradation of air quality during construction.

- o Possible aggravation of existing nonattainment conditions in Tucson for total suspended particulates and carbon monoxide.
- o Possible short-term increases in noise levels because of construction activities.

WATER RESOURCES

AREAS OF INVESTIGATION: Availability of Surface Water and Groundwater and Water Quality Conditions

DISCUSSION: The major surface water features are the Santa Cruz and San Pedro rivers. Nearly all of the water supply is derived from groundwater and the upper Santa Cruz groundwater basin has been declared as a sole source aquifer. Groundwater quality is generally good, although locally high levels of nitrate and dissolved salts do exist. Total water use in recent years has averaged about 0.5 million acre-feet, resulting in large declines in the water table. The delivery of Central Arizona Project water to Tucson in the early 1990s will assure a reliable municipal supply and partially halt the rapid decline of the water table in that area.

TYPICAL ISSUES:

- o Potential alteration in surface drainage patterns.
- o Groundwater withdrawal from overdrafted basins.
- o Possible water quality degradation in a sole-source aquifer in the upper Santa Cruz Basin.
- o Possible interference and/or elimination of existing water users.
- o Compliance of the proposed project with state water law.

GEOLOGY AND SOILS

AREAS OF INVESTIGATION: Engineering Geologic Conditions Including Potential Geologic Hazards and Conditions of Geologic Materials, Regional Energy and Mineral Resources, and Soil Resources

DISCUSSION: Mountain ranges in the proposed project area trend north-south and consist of volcanic and metamorphic rocks, with some granitic rocks in northern portions of the area. Basin areas between mountain ranges are underlain by extensive thicknesses of sediments. The maximum credible earthquake is estimated to have a magnitude of 7.5. Areas susceptible to ground subsidence due to groundwater withdrawal and mass movements (e.g., debris flows) also exist in the area. Several occurrences of commodities or raw materials on the Strategic and Critical Materials list have been documented in the region, and active mining districts exist for select commodities such as copper. Geothermal waters are the only identified energy resource in the proposed project area. Concrete-quality aggregate is extremely rare. Prime farmlands occur in the Santa Cruz Valley. Areas of high to moderate potential for wind and sheet erosion are frequently associated with the young alluvial fans and floodplains of the region.

TYPICAL ISSUES:

- Public health and safety considerations associated with faulting and seismic effects in the region.
- Conflicts with mineral resource extraction.
- Availability of concrete-quality aggregate.
- Effects on important farmlands in Santa Cruz River Valley.